# Jak to się robi w Ameryce
# czyli matematyka w California State University Fresno


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Department of Mathematics

California State University Fresno (do 06/2024)

# "Jak to się robi w USA/Kalifornii" czyli...

- Organizacja systemu publicznej edukacji wyższej w pigułce
  - Przygotowanie matematyczne nowych studentów
- Matematyka na Fresno State
  - Czego uczyłem
  - Jak uczyłem
- Subiektywny przegląd technologii
- Okres COVID czyli jak nam szło zdalne uczenie
- Uwagi końcowe czyli jak to wszystko wspominam

# Publiczny system edukacji wyższej

- Community Colleges
- Universities
  - University of **Nazwa_Stanu Miasto** (nastawione na nauczanie)
    - (University of California San Diego)
  - University of California San Diego **Nazwa_stanu** State University **Miasto**
    - **(**California State University Fresno)

# Kalifornia: ideały vs. rzeczywistość

- Stanowy wymóg: 2 lata matematyki w klasach 9-12 (większość szkół: 3)
- Stopnie ze szkoły vs. faktyczne kompetencje matematyczne (no SAT)
- Przykładowe *acceptance rates* 2025*:*
  - CalPoly San Luis Obispo: ok. 22500/82000 (24%)
  - Fresno State: ok. 20000/20900 (96%)
    - *Yield rate* (wybierający/przyjęci): ok. 3450 (17%)

| First-time Freshmen | | | | | |
|---|---|---|---|---|---|
| **Applicants** | 20,920 | 21,739 | 20,335 | 18,682 | 15,231 |
| **Admits** | 20,057 | 20,501 | 19,469 | 17,703 | 14,816 |
| **Admit rate** | 96% | 94% | 96% | 95% | 97% |
| **Enrolled** | 3,449 | 3,591 | 3,662 | 3,459 | 3,453 |
| **Yield rate** | 17% | 18% | 19% | 20% | 23% |

# Fresno State: *colleges*

- Craig School of Business (m.in. mają MBA)
- College of Arts and Humanities (m.in. muzyka, teatr)
- College of Health and Human Services (m.in. pielęgniarstwo)
- **College of Science and Mathematics**
  - **Biology, Chemistry and Biochemistry, Computer Science, Earth and Environmental Sciences, Mathematics, Physics, Psychology**
- College of Social Sciences
- Jordan College of Agricultural Sciences and Technology
- Kremen School of Education and Human Developement
- Lyles College of Engineering
  - Civil and Geomatics Engineering, Construction Management, Electrical and Computer Engineering, Mechanical Engineering

# Matematyka na Fresno State

- Academic level numbering
  - Lower-Division (freshmen; College Algebra, Calculus Series)
  - Upper-Division (juniors and above; Real Analysis, Num. Analysis, Stat. Methods, Discrete Structures, Linear Algebra, ale nie tylko)
  - Graduate (Master of Science in Math; Abstract Algebra, Topology, Measure Theory)
- Functional Classification
  - General Education (GE) "Quantitative Reasoning" - niezależnie od kierunku studiów musisz zaliczyć przynajmniej 1 taki kurs;
  - Co-Requisite/Support Courses - kursy pomagające uzupełnić braki
  - Math Major Concentration Options - dla studentów chcących uzyskać licencjat lub magisterium z matematyki

# Matematycy na Fresno State (2017 r.)

# Kogo i czego uczyłem

- *Calculus I* (7 semestrów / 332 studentów)
- *Calculus II* (5/216)
- *Calculus III* (8/356)
- *Exploring Mathematics* (10/782)
- *Concepts and Methods of Mathematics* (6/178)
- *Precalculus* (2/127)
- *Perspectives in analysis* (1,3)

# Calculus I (15 tygodni, 4 godziny tygodniowo)

- Przegląd funkcji elementarnych i własności funkcji
- Granica funkcji w punkcie (w tym nieskończone), ciągłość - bez epsilonów!
- Pochodna funkcji i co pochodne nam mówią o samej funkcji
- Zastosowania pochodnych czyli badamy kształt wykresu, minimalizujemy koszty itp.
- Granice funkcji w nieskończoności ("end behavior")
- Funkcja pierwotna i zagadnienie początkowe plus powiązana fizyka
- Całka oznaczona - definicja, całki funkcji elementarnych całkowanie przez podstawienie;
- Twierdzenia w zasadzie bez dowodów

# Calculus II (15 tygodni, 4 godziny tygodniowo)

- Geometryczne zastosowania całek
- Fizyczne zastosowania całek (masa, praca, parcie hydrostatyczne)
- Modele wykładnicze (rozpad promieniotwórczy, wzrost populacji)
- Całkowanie przez części
- Techniki całkowania funkcji trygonometrycznych, funkcji wymiernych i funkcji niewymiernych
- Ciągi liczbowe i szeregi liczbowe
- Szeregi potęgowe, szeregi Taylora
- Równania parametryczne krzywych na płaszczyźnie, współrzędne biegunowe, równania biegunowe krzywych i ich rachunek różniczkowy i całkowy
- Krzywe stożkowe

# Calulus III (15 tygodni, 4 godziny tygodniowo)

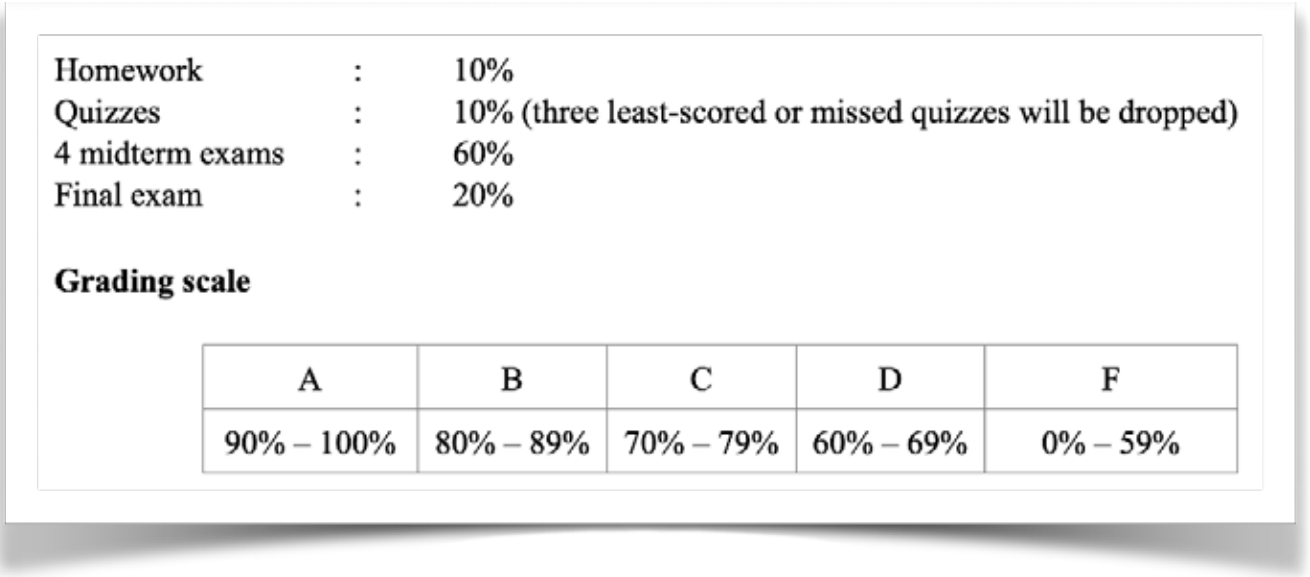
- Rachunek wektorowy na płaszczyźnie i w przestrzeni
  - Iloczyn wektorowy, skalarny i mieszany
  - Równania prostych i płaszczyzn w przestrzeni
  - Współrzędne cylindryczne i sferyczne, powierzchnie drugiego stopnia
- Funkcje o wartościach wektorowych, ruch w przestrzeni (1 -> wiele) i ich rachunek różniczkowy i całkowy (prędkość, przyspieszenie, długość łuku)
- Rachunek różniczkowy funkcji wielu zmiennych (2 lub 3 -> 1)
- Całki podwójne i potrójne i ich zastosowania
- Analiza wektorowa (całki krzywoliniowe i powierzchniowe, twierdzenie Ostrogradzkiego-Gaussa i twierdzenie Stokesa) (2 -> 2 lub 3 -> 3)

# Rygorystyczny wymóg dla STEM: Calculus Readiness

- Jak się testuje tę gotowość
  - ALEKS PPL (Placement, Preparation and Learning) lub
  - High School Calculus Course (with A or B)
  - Advanced Placement Credit czyli zdanie egzaminu przed oficjalnym ciałem stanowym: College Board AP Calculus AB exam lub
  - Zdanie kursu Math 6 (Pre-calculus) z oceną A lub B lub
  - Zdanie kursów Math 3 (College Algebra) i Math 5 (Trigonometry) z oceną A lub B

# Course, Class, Add, Drop, Pass, Fail

- Liczność grup: do 36
- Brak ćwiczeń (chyba, że L lub grant)
- Syllabus - kontrakt ze studentem
  - learning outcomes
  - course policy
  - grading procedures
  - course calendar
- Final exams schedule
- Prerequisites and permission numbers
- Drop for compelling reasons



| | | |
|---|---|---|
| Homework | : | 10% |
| Quizzes | : | 10% (three least-scored or missed quizzes will be dropped) |
| 4 midterm exams | : | 60% |
| Final exam | : | 20% |

**Grading scale**

| A | B | C | D | F |
|---|---|---|---|---|
| 90% – 100% | 80% – 89% | 70% – 79% | 60% – 69% | 0% – 59% |

# COURSE SYLLABUS

## Math 75 – Calculus I
## Fall 2023

| | |
|---|---|
| **Course Modality:** in-person | |
| Course ID:<br>Math 75-13 (Section 75592)<br>Math 75-15 (Section 76400) | Instructor Name:<br>Przemyslaw Kajetanowicz |
| **Units: 4** | Department of Mathematics<br>California State University, Fresno |
| **Class Meeting Location & Time:**<br>MacLane Annex 62;<br>#75592: MTWTh 11:00 – 11:50 p.m.<br>#76400: MTWTh 12:00 – 01:50 p.m. | Email / Telephone:<br>przemek@mail.fresnostate.edu<br>tel. 278-4998 |
| **Canvas:** *fresnostate.instructure.com* | Office: Science 2, Room 247 |
| **Prerequisites:** Mathematics placement category I or II, and calculus placement according to department standards. | Student Support Hours (office hours):<br>T 09:30 – 10:30 AM and 05:00 – 06:30 PM<br>W 09:30 – 10:30 AM and 05:00 – 06:30 PM |

# Syllabus c.d.

**Course description**: Functions, graphs, limits, continuity, derivatives and applications, definite and indefinite integrals. G.E. Foundation B4. FS. It is usually expected that students will spend approximately 2 hours of study time outside of class for each one hour in class. Since this is a 4-unit class, you should expect to study an average of 8 hours outside of class each week.

**REQUIRED COURSE MATERIALS**

**Textbook:** Calculus Volume 1, Gilbert Strang, Edwin "Jed" Herman, et al 2020. This book is available online at no cost or as a free PDF file at OpenStax:

https://openstax.org/details/books/calculus-volume-1

**Online homework system:** You will need to buy access to the program Knewton Alta for the homework. For more information on Knewton Alta, see

https://www.knewton.com

# Course goals (Math 75 syllabus)

**Course goals**: Upon completion of this course, students should understand:

- the benefits and limitations of mathematical models;
- the concept of a limit;
- continuous functions;
- the definition of a derivative as a limit of difference quotients;
- how to interpret the derivative in the context of real-world examples;
- the definition of antiderivatives;
- the integral as an area or the distance traveled by a moving object;
- the idea of an "area function" under the graph of a function *f,* and how it relates to the function *f* itself;
- the two parts of the Fundamental Theorem of Calculus;
- the relationship between integrals and antiderivatives.

# Learning outcomes (Calc I syllabus)

**Student Learning Outcomes:** Upon completion of this course, students should be able to:

- use functions to represent changing quantities;
- compute limits of algebraic expressions;
- compute the derivative of transcendental functions, or any combination of such functions;
- identify the ways in which a function can fail to have a derivative
- compute certain simple antiderivatives;
- find maximum and minimum values of functions;
- solve “real world” optimization problems by converting them into the language of calculus;
- compute the indefinite integral of some transcendental functions;
- define the definite integral as the limit of Riemann sum approximations;

# GE Requirement (Math 75 syllabus)

**GE Area B4 Learning Outcomes:** Math 75 is a GE Area B4 course. Upon completion of an Area B4 (Quantitative Reasoning) course, students will be able to:

1. Represent and explain mathematical information beyond the level of intermediate algebra symbolically, graphically, numerically and verbally.
2. Apply mathematical models of real-world situations and explain the assumptions and limitations of those models.
3. Use mathematical models to find optimal results, make predictions, draw conclusions, and check whether the results are reasonable.

# Syllabus c.d.

**Homework**: Homework will be assigned using Knewton Alta online homework system. Knewton Alta provides feedback as to whether you have done a problem correctly, and it also provides a worked-out solution to the problem (regardless of whether you got the answer correct). Knewton Alta is an adaptive homework system, which means that the number of problems you are assigned depends on your performance on those problems. Although everyone will not get the same number of homework problems to do, everyone should get to the same level of skill with the material. Homework will be typically assigned once or twice a week. The details as to how the homework system works will be explained during the first classroom meeting. A link will be created on Canvas to enable you easy access to your homework assignments.

Each homework assignment has its due date, but the assignment will remain available for 3 days past that due date. After that, the assignment will no longer be available for you to complete. Moreover, a penalty of 10% of available mastery score will be applied for each calendar day of late completion of homework.

# Syllabus c.d.

**Activity Sessions:** This course has a support of supplemental lab activity sessions. The sessions meet weekly for 80 minutes per session and consist of activities and problems designed to help you learn the material more deeply. You must be enrolled in an activity session. Attendance is required and a weekly quiz will be given.

**Concept and application assignments:** There will be (typically weekly) homework assignments which focus on your conceptual understanding and applications of these concepts. The assignments will be posted on Canvas. You will be submitting those assignments online to Canvas in the form of a single pdf file. The assignments will be typically due on Sunday at 11:59PM through Canvas online submission system. Students can use these assignments for their GE B4 portfolio.

# Syllabus c.d.

**In-class Quizzes**: There will be five 15-minute quizzes, reflecting the material recently covered in class and on homework assignments. The dates of the quizzes are specified in the tentative course schedule at the end of this document. The lowest-scored or missed quiz will be dropped from calculations. No make-up quizzes will be given except for a compelling reason such as a jury duty or an illness documented by a doctor's note.

**Online Quizzes:** In addition to the in-class quizzes, I am planning on giving additional Canvas quizzes, taken from home. The purpose of the additional quizzes is to help you boost your overall quiz score. The total number of quizzes will thus increase, and the number of least-scored quizzes that I drop from the calculation will increase accordingly. In other words, of all the quizzes (in-class and online), the best four quizzes will be considered in calculating the total score for the quiz category.

# Syllabus c.d.

**Midterm exams and the final exam.** There will be four midterm exams and the final exam. The dates of midterm exams as well as the date and time of the final exam are specified in the tentative course schedule at the end of this document. The final exam is comprehensive. No make-up exams will be given except for a compelling reason such as an illness documented by a doctor's note or a jury duty. The midterm exams will address respective portions of material that we have covered. The scope of material for each exam is specified in the tentative course schedule at the end of this document. I may want to specify the scope of material for an exam in greater detail in class a week before the exam date (for example, if we do not cover some of the material and I will decide not to include it in the exam).

I may require you to put this statement at the end of your exam paper: *I have done my own work and have neither given nor received unauthorized assistance on this work.*

# Syllabus c.d.

**Missed quizzes/exams:** Your absence on an exam date will result in you receiving a score of 0 for that exam (except for the extenuating circumstances mentioned above). If any emergencies occur, then any (official) document related to such emergency must be presented to request a makeup. I must be notified IN ADVANCE of your absence on a quiz/exam. *Having exams rescheduled is not permitted for reasons such as plane ticket purchased earlier, weddings, vacations, bad weather, club/band trips, etc*

**Final exam date and time**:
Section 75592 (11:00 – 11:50 a.m. class): Dec 11 (Monday), 11:00 a.m. – 01:00 p.m.
Section 76400 (12:00 – 12:50 p.m. class): Dec 13 (Wednesday), 01:15 – 03:15 p.m.

# Syllabus c.d.

**Classroom Behavior:** To maintain a respectful learning environment, please: (1) make sure that all cell phones and pagers are turned off for the duration of class, and (2) do not talk, whisper, or engage in other distracting behavior when either the instructor or a fellow classmate is talking (and, of course, during quizzes and exams). Such behavior includes chewing gum, sending/receiving text messages, and using an electronic device for any purpose other than taking notes. Any student conduct that disrupts the learning process will not be tolerated and may lead to removal from class and/or other disciplinary action. University policies on disruptive behavior are followed and enforced in every instance. Video recording and voice recording in this class is not allowed without the permission of the instructor.

# Course calendar

**TENTATIVE COURSE SCHEDULE (SUBJECT TO MINOR CHANGES IN THE EVENT OF EXTENUATING CIRCUMSTANCES)**

| | Date(s) | Topics | Reading assignment (related textbook sections) |
|---|---|---|---|
| 1 | Aug 21 - 24 | Review of functions; basic classes of functions | 1.1 – 1.2 |
| 2 | Aug 28 – 31 | Trigonometric functions; inverse functions; exponential and logarithmic functions;<br>**Quiz 1 Thursday: 1.3 – 1.5** | 1.3 – 1.5 |
| 3 | Sep 5 - 7 | The limit of a function; the limit laws; | 2.1 – 2.3 |
| 4 | Sep 11 - 14 | The limit laws (cont.); continuity;<br>**Quiz 2 Thursday: 2.2 – 2.4** | 2.3 – 2.4 |
| 5 | Sep 18 - 21 | The concept of the derivative;<br>derivative as a function; differentiation rules;<br>**Midterm 1 Monday: Chapters 1 and 2** | 3.1 – 3.3 |

# Jak uczyłem Calculusa

- Calculus I, Calculus II - w dużej mierze nadrabianie zaległości
  - Listy zadań z obszernym wstępem
  - Praca grupowa studentów (WWH)
  - C&A Assignments (WWH)
- Calculus III - wyzwania, ale ciekawe
  - Przejście do języka wektorowego
  - Fizyka i geometria gdzie tylko się da
  - Redukowanie liczenia

# Calculus III - zasady zaliczenia (grading procedures)

| | | |
|---|---|---|
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**Egzamin końcowy nie wystarczy !**

# Math 100 (15 tyg., 2 x 75 min. tygodniowo)

- Ważny kurs: daje uprawnienia do uczenia w szkole
- Specjalnie napisany podręcznik
  - Problem solving
  - Representation and operations (fractions)
  - Number sense
  - Algebraic thinking
  - Geometric thinking
- Bardzo zróżnicowany poziom studentów

# Jak uczyłem Math 100
# (i siebie przy okazji na zajęciach Agnes)

- Students' reflections: "I've been always scared of math", "I'm a horrible test-taker", "I work more but my grade is going down",
- Nieoceniony układ sali (stoły zamiast krzesełek)
- Wyzwanie: wyplenić złe nawyki szkolne ("So, what are the steps of the solution?" i odpowiedź: "solve the problem in more than one way")
- Ciągłe zapewnianie, że "I don't belong in math" jest zdaniem fałszywym
- Regularne zadania domowe i sposób ich oceniania

# Math 100 - Polya's four steps of problem solving

*There are ducks and rabbits in a yard. Together, they have 12 heads and 30 legs. How many of the animals are ducks and how many are rabbits?*

*There was a jar of cookies on the table. Becky was hungry because she hadn't had breakfast, so she ate half the cookies. Then Jill came along and noticed the cookies. She thought they looked good, so she ate a third of what was left in the jar. Denise came by and decided to take a fourth of the remaining cookies with her to her next class. Then Jodi came dashing up and took a cookie to munch on. When Megan looked at the cookie jar, she saw that there were two cookies left. How many cookies were there in the jar to begin with?*

# Math 100 - tak mnie podsumowali

If math is not a strong subject for you, you might want to try to take it with someone else, of course good luck because he's teaching the majority of the classes for math 100. He grades homework very unfairly and grades tests equally tough. He makes you teach yourself, and says to read the book which is equally unhelpful.

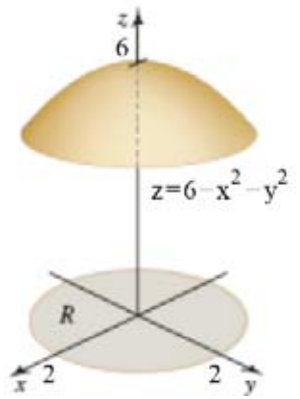
This class was the one class I just could not wrap my mind around. I spent entire weekends focusing on just this classs materials, and I still ended up barley passing, If you consider a D passing when youre paying out of pocket. When I tried to talk to the professor, things just got more confusing. Half the class failed the midterm :( Beware.

# Wszędobylska technologia

- Canvas i online submissions
- Komercyjne systemy zadań domowych
  - Pearson
  - Knewton Alta
- Google drive
- Zoom
- Wyposażenie sal - nie to, że było, ale było zrobione z głową

# Pułapki technologii (a raczej przesadnej wiary w nią)

Find the volume V of the solid below the paraboloid $z = 6 - x^2 - y^2$ and above the following region.




$R = \{(r,\theta): 0 \le r \le 2, 0 \le \theta \le 2\pi\}$

Set up the double integral, in polar coordinates, that is used to find the volume.

$$\int \quad \int \quad (\quad) \, dr \, d\theta$$

(Type exact answers.)

# Co ChatGPT mówi na takie zadanie

Which of the following statements are true and which are false?

$$\text{If } g(x) < 0 \text{ for all } x \neq a, \lim_{x \to a} f(x) = -5$$

$$\text{and } \lim_{x \to a} g(x) = 0 \text{ then } \lim_{x \to a} \frac{f(x)}{g(x)} = \infty$$

**False.**

The issue is that $\lim_{x \to a} g(x) = 0$ does **not** tell us whether $g(x)$ approaches $0$ from the negative side only. We only know that $g(x) < 0$ for $x \neq a$, so near $a$, $g(x)$ is negative and very small.

Since

$$\lim_{x \to a} f(x) = -5,$$

$f(x)$ is negative and close to $-5$ near $a$. Thus near $a$,

- numerator $f(x)$ is negative,
- denominator $g(x)$ is negative and tends to $0$.

Therefore

$$\frac{f(x)}{g(x)}$$

is positive and its magnitude grows without bound, suggesting the limit should be $+\infty$.

However, to conclude $\lim_{x \to a} \frac{f(x)}{g(x)} = +\infty$, we need $g(x)$ to be nonzero and negative in some deleted neighborhood of $a$, which is indeed guaranteed by $g(x) < 0$ for all $x \neq a$.

A rigorous argument: because $f(x) \to -5$, there exists $\delta_1 > 0$ such that

$$|x - a| < \delta_1 \implies f(x) < -4.$$

Given any $M > 0$, since $g(x) \to 0$, there exists $\delta_2 > 0$ such that

$$|x - a| < \delta_2 \implies |g(x)| < \frac{4}{M}.$$

# Jak technologia pomagała mnie samemu

**Problem**. Let $H$ be a positive number and let $0 < a < 1$. Let $S$ be the solid inside the cone $z = \sqrt{x^2 + y^2}$, above the plane $z = aH$ and below the plane $z = H$ (see figure below). $S$ is commonly called a frustrum of a cone.

Use a triple integral and spherical coordinates to verify by computation that the volume of $S$ is equal to

$$|S| = \frac{1}{3}\pi \left(1 - a^3\right) H^3 \tag{1}$$

Notice that if $a = 0$ then (1) is the well-known formula for the volume of the "full" cone with radius $H$ and height of $H$. Also, notice that for $a = 1$, we obtain $|S| = 0$, which makes perfect sense because in that case, the solid "shrinks" to the upper circle in the figure below.

Hint: inspect the solution of a similar problem worked in class on Nov 1 (the equations of the planes were $z = 1$ and $z = 2$, respectively).

# Jak technologia pomagała mnie samemu

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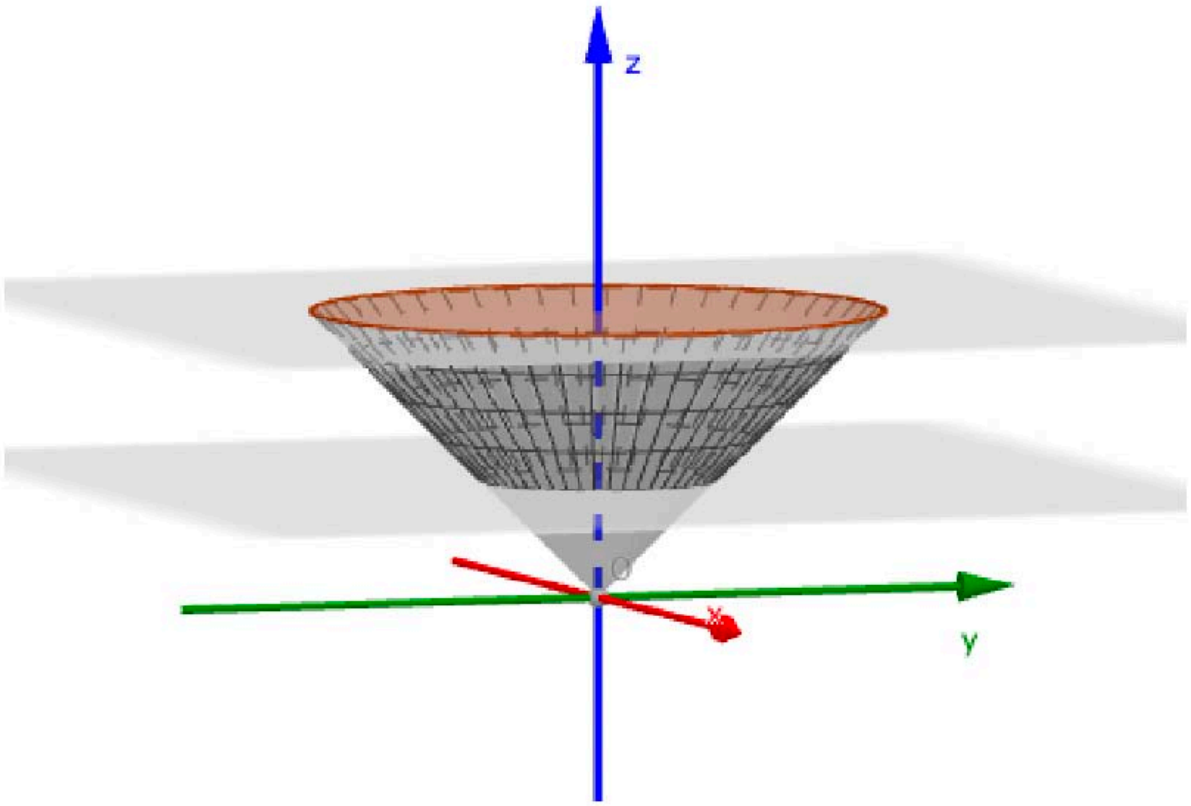
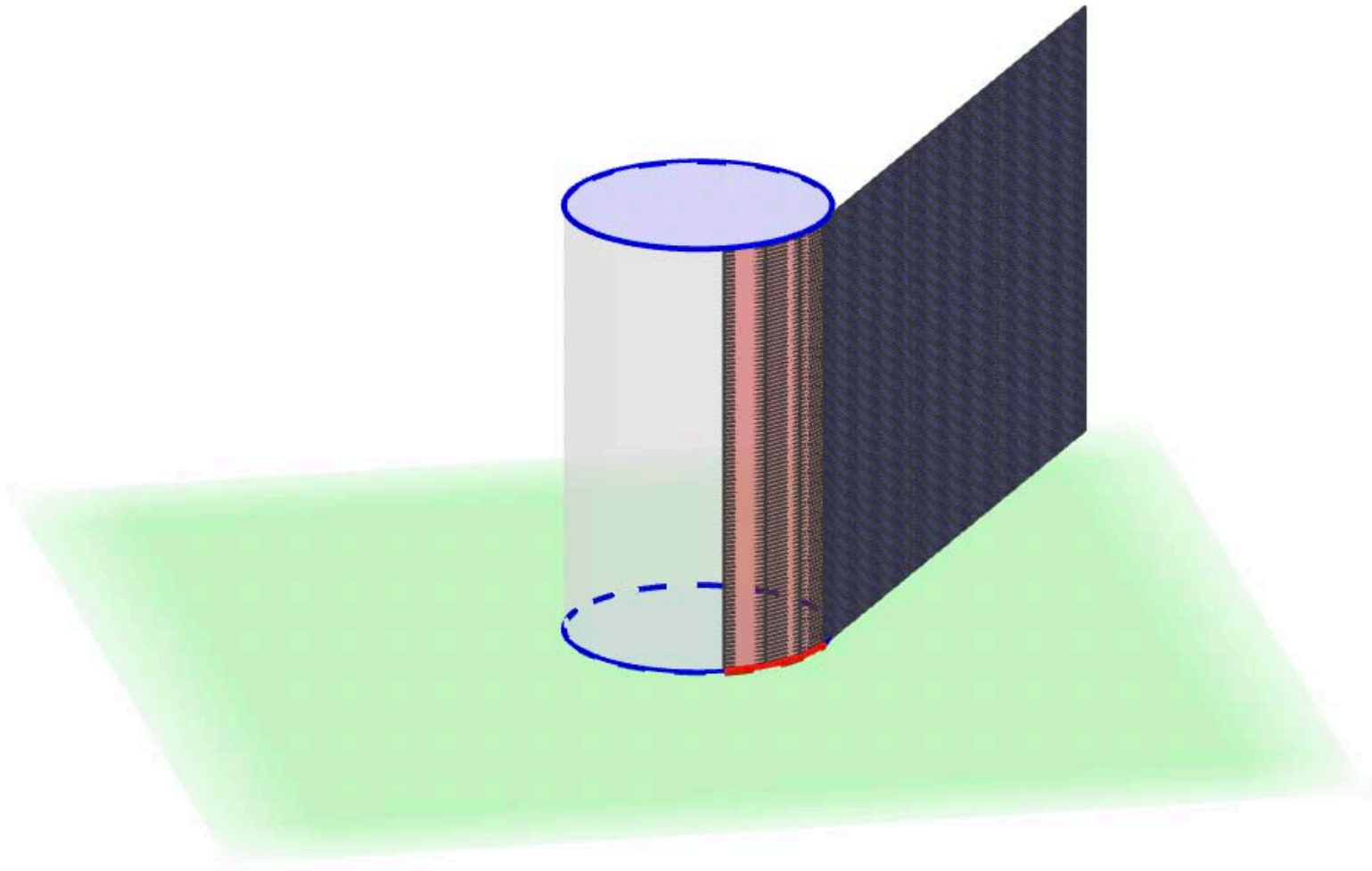
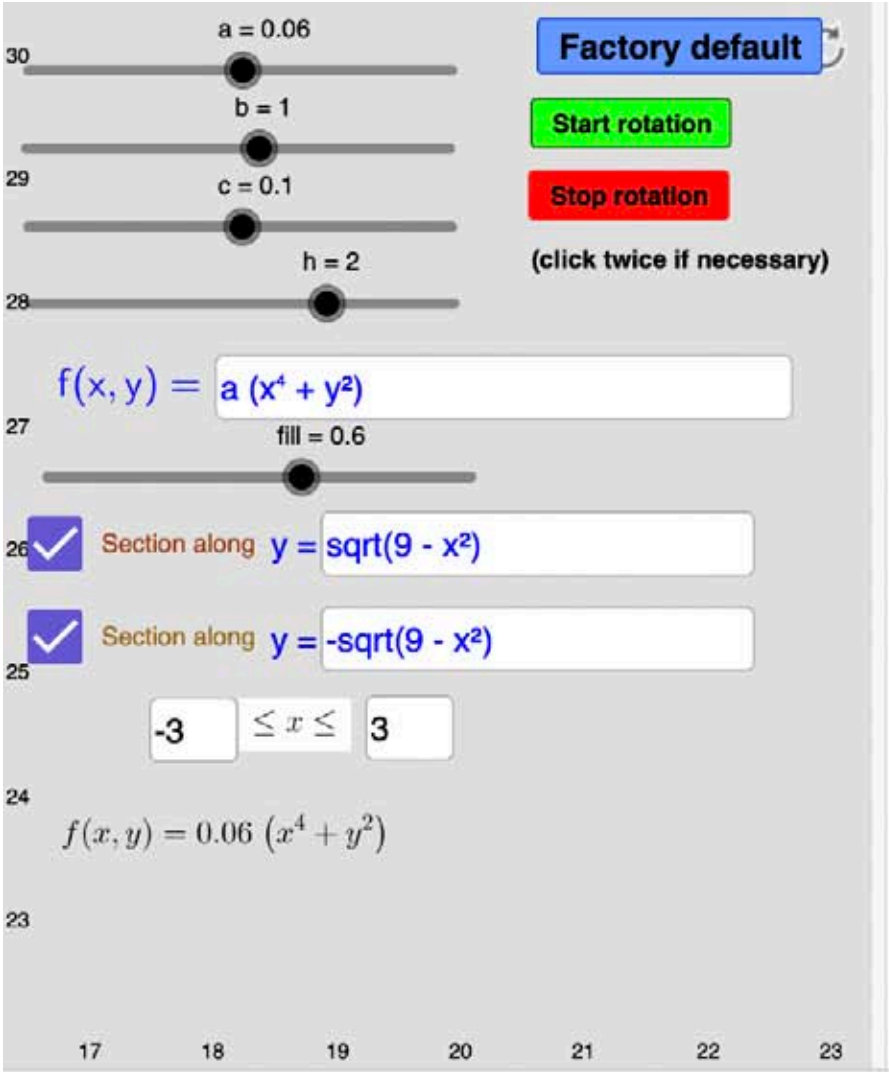
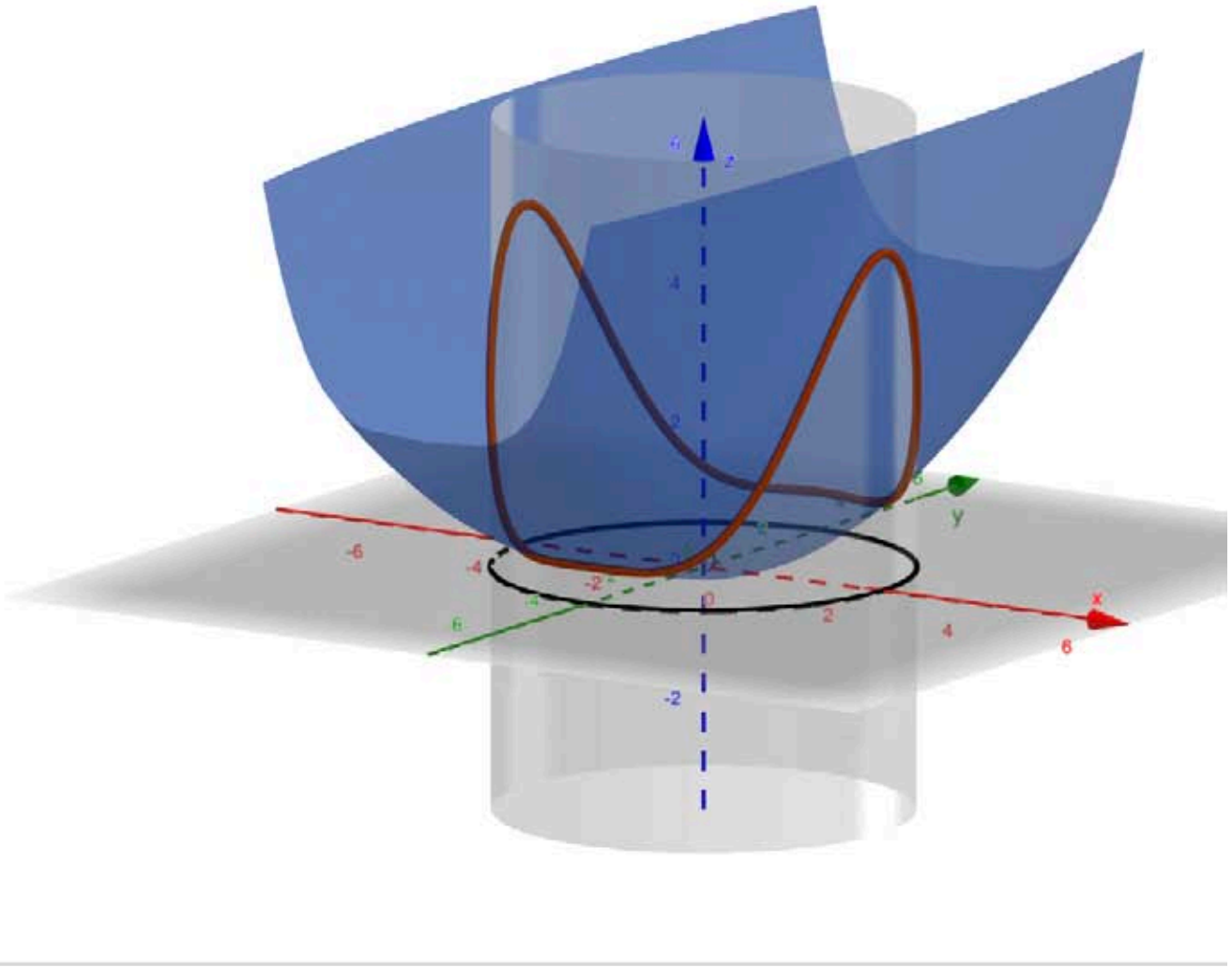


# Jak oswoić wzór na pole powierzchni bocznej



# Jak oswoić ekstrema warunkowe



# Jak oswoić pochodną kierunkową

x0 = 1

y0 = 1

alfa = 2°

Start rotation

Stop/Reset

(click twice if necessary)

Pause

$\vec{v} = [\cos\alpha, \sin\alpha] = [1, 0.03]$

$\mathrm{grad}\, f(x_0, y_0) = [2, 2]$

$$D_u f(x_0, y_0) = \lim_{h \to 0} \frac{f(x_0 + v_x h, y_0 + v_y h) - f(x_0, y_0)}{h}$$

$$\frac{\partial f}{\partial \vec{v}}(x_0, y_0) = \vec{v} \circ \mathrm{grad} f(x_0, y_0)$$

$\mathrm{grad} f(x_0, y_0) = [f_x(x_0, y_0), f_y(x_0, y_0)] = [2, 2]$

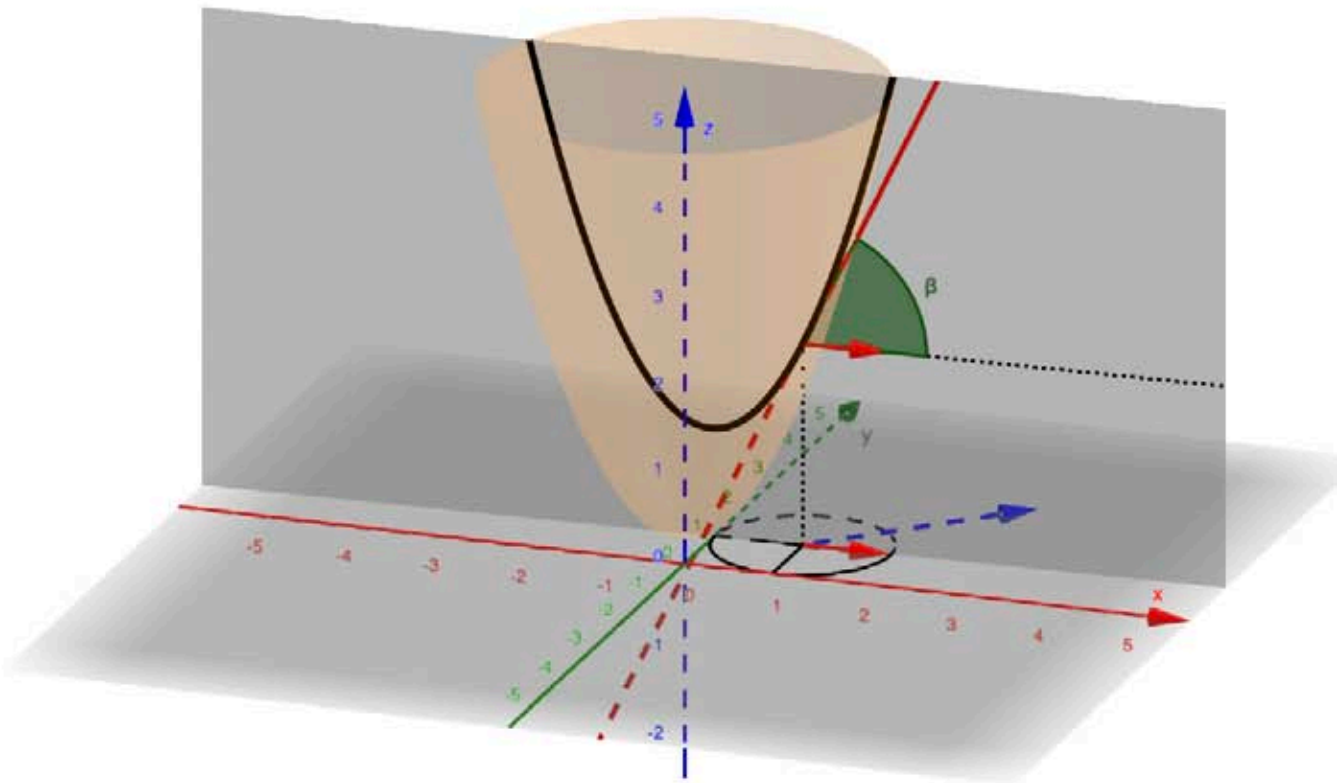
$D_u f(x_0, y_0) = 2.07 = \mathrm{tg}\ \beta$

Show plane

Show angle

$D_u f(x_0, y_0) = 0 \Leftrightarrow \vec{v} \perp \mathrm{grad} f(x_0, y_0)$ Show

$|D_u f(x_0, y_0)| = max \Leftrightarrow \vec{v} \parallel \mathrm{grad} f(x_0, y_0)$ Show



# Jak oswoić całkę krzywoliniową

a = 0.4

b = 3.1

c = 2

Start rotation

Pause

Stop rotation

(click twice as needed)

$f(x, y) =$ a (x² + y²)

fill = 0.04

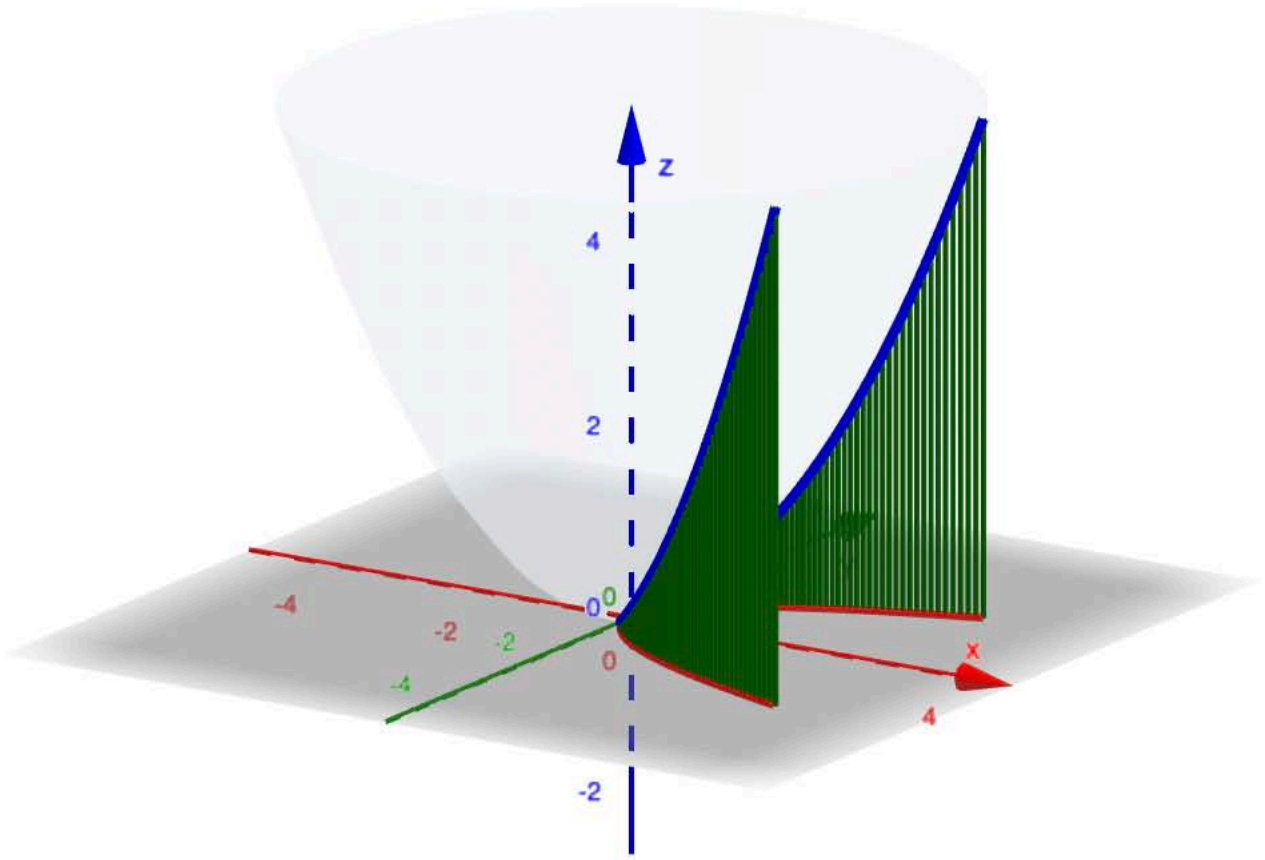
x(t) = b t²

y(t) = c t

-1 ≤ x ≤ 1

Along segment

Curtain density



# Jak oswoić zagadnienie początkowe (Math 270)

**Initial value problem:**

$$y' = \frac{x}{y}$$

$$y(2.64) = 2.2$$

**Solution:**

$$y = \frac{\sqrt{625\,x^2 - 1331}}{25}$$

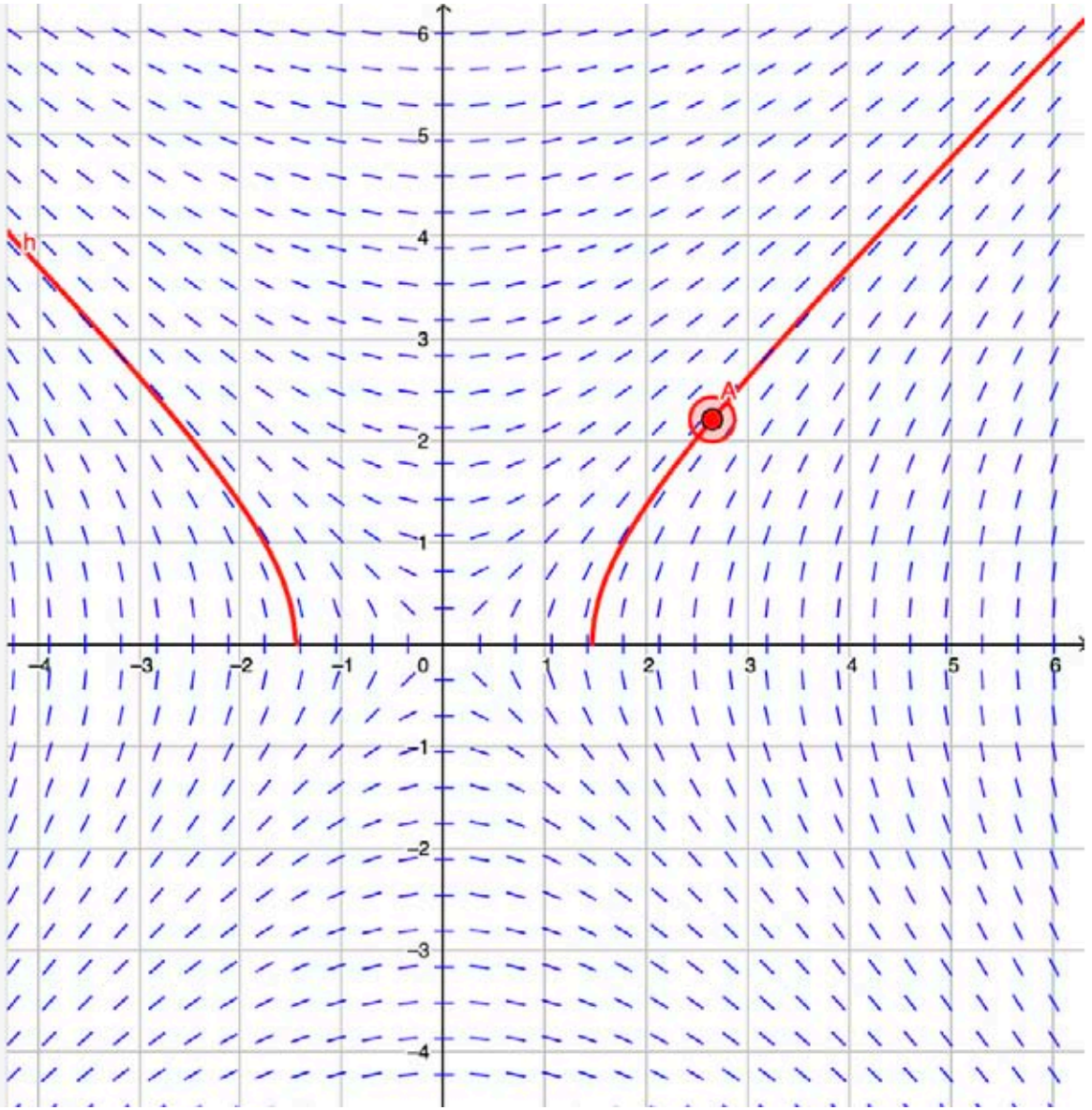
**Try these:**

$\frac{dy}{dx} = \frac{x}{y}$ $\frac{dy}{dx} = -\frac{x}{y}$

$\frac{dy}{dx} = \frac{y}{x}$ $\frac{dy}{dx} = -\frac{y}{x}$

**... or enter your own input:**

f(x,y) = p(x, y)



# Jak produkować dużo takich zadań i nie zginąć

Change the order of integration in the integral

$$\int_0^1 \int_{e^y}^e f(x,y)dxdy$$

:

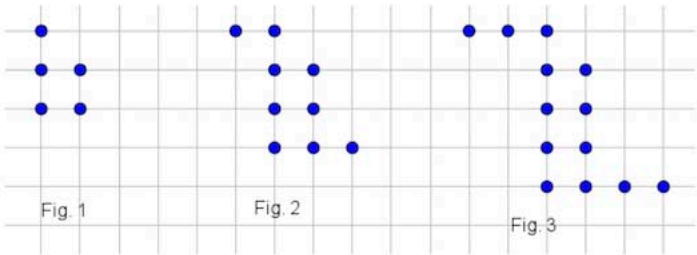
- $\int_1^e \int_0^{\ln x} f(x,y)dydx$
- $\int_0^e \int_0^{\ln x} f(x,y)dydx$
- $\int_1^e \int_{\ln x}^1 f(x,y)dydx$
- $\int_0^e \int_{\ln x}^1 f(x,y)dydx$

For which of the following functions is the line **x** = 3 a vertical asymptote? Select all that apply.

Note: if you check the box incorrectly, negative scores apply to what you may have earned on correct answers.

- $f(x) = \frac{(x^2-2x-3)^2}{(x-3)^3(x+5)}$
- $f(x) = \frac{\sqrt{x^2-x-6}}{(x-3)(x+5)}$
- $f(x) = \frac{x^3-x^2-6x}{(x+1)\sqrt{x-3}}$

The picture below presents sets of dots in Figure 1, Figure 2 and Figure 3.




Determine the number of dots in figure 69.

# Jak produkować dużo zadań i nie zginąć

Problem:

**given b and a sequence $(a_n)$ where $a_n$ depends on a parameter A, find the value of A such that $\lim_{n\to\infty} a_n = b$.**

The function below generates the solution of the problem and the LaTeX for the related expressions.

Syntax: **makeMyLimits**[ expr, { b_1, b_2, ..., b_k } ], where expr is the general term of $(a_n)$ and b_1,... are values of b.

# Dla jakiej wartości parametru *A* podany ciąg jest zbieżny do b?

```
makeMyLimits[ ((A + 4) m^3 + m)/(3 A m^3 + 2 m), m, {1/4, 3}]
```

My sequence is: $\frac{(A+4)\,m^3+m}{3\,A\,m^3+2\,m}$, converging to $\frac{4+A}{3\,A}$.

The resulting equation with $A$ as the unknown is $\frac{4+A}{3\,A} = b$.

Version for b = $\frac{1}{4}$:

LaTeX for the equation:

```
\displaystyle \lim_{m \to \infty}\frac{(A+4) m^3+m}{3 A m^3+2 m} = \frac{1}{4}
```

Solution of the problem:

$\frac{4+A}{3\,A} = \frac{1}{4}$ iff A = -16

Solution in LaTeX form: -16

# No I przyszedł COVID...

Przemyslaw Kajetanowicz

**Transition to virtual instruction (my Math 100 and Math 76 classes)**

As we are all aware, we are transitioning from person-to-person into virtual instruction effective March 20 (Friday next week). In-person, on-campus classes are suspended from Monday March 16 through Thursday March 19.

I am in the process of working the details of our class instruction after the transition. **Please stay tuned for further announcements on Canvas.**

I encourage you to carefully read the rest of this document to ensure you have the information needed to anticipate how you will be working after the transition period.

1. Please be prepared to remotely participate in virtual classroom meetings on regular class days at regular class times. The meetings will be held with the use of Zoom. Please be sure to familiarize yourself with Zoom (if you are new to it) by going to

   zoom.fresnostate.edu

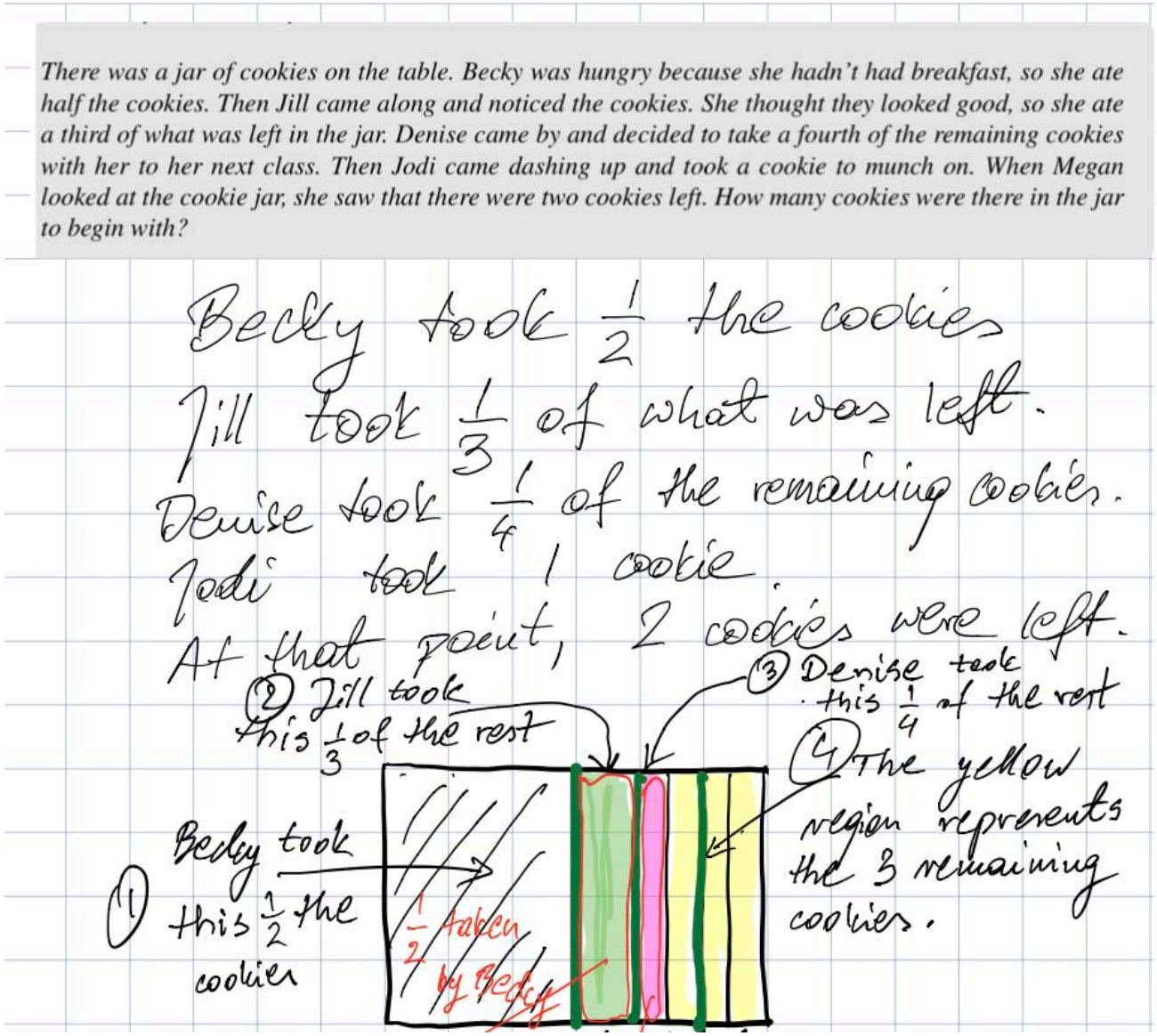
   and following the on-screen instructions (see the screen shot below).

# Uczenie w czasie COVID

- Główne wyzwania
  - Brak kontaktu osobistego ze studentami i między studentami
  - Problem kontroli samodzielności (i niewypały typu Lock Down Browser)
  - Męczący brak twarzy na ekranie
- Jak sobie próbowaliśmy radzić
  - Nieoceniony iPad + *Notability*
  - Break-out rooms
  - Praca grupowa na dokumentach Google drive
  - Quizy i egzaminy w dwóch formach
  - Okazywanie studentom zrozumienia

# Uczenie w czasie COVID

*There was a jar of cookies on the table. Becky was hungry because she hadn't had breakfast, so she ate half the cookies. Then Jill came along and noticed the cookies. She thought they looked good, so she ate a third of what was left in the jar. Denise came by and decided to take a fourth of the remaining cookies with her to her next class. Then Jodi came dashing up and took a cookie to munch on. When Megan looked at the cookie jar, she saw that there were two cookies left. How many cookies were there in the jar to begin with?*



# Uczenie w czasie COVID

**Example.** Find the Maclaurin series of $f(x) = \dfrac{6}{2-x^2}$

$$\sum_{n=0}^{\infty} \frac{f^{(n)}(0)}{n!} x^n$$

$$\frac{6}{2-x^2} = \frac{6}{2\left(1-\left(\frac{x}{\sqrt{2}}\right)^2\right)} = \frac{3}{1-\left(\frac{x}{\sqrt{2}}\right)^2}$$

$$\frac{a}{1-r} \qquad \sum_{n=0}^{\infty} ar^n$$

$$= 3 + 3\cdot\frac{x^2}{2} + 3\cdot\frac{x^4}{2^2} + 3\cdot\frac{x^6}{2^3} + \dots \qquad \frac{x^2}{2}$$

$$= \sum_{n=0}^{\infty} \frac{3\cdot x^{2n}}{2^n}$$

Interval of conv.

$$-1 < \frac{x^2}{2} < 1$$

$$-2 < x^2 < 2$$

$$-\sqrt{2} < x < \sqrt{2}$$

$$f'(x) = -\frac{6}{(2-x^2)^2}(-2x) = \frac{12x}{(2-x^2)^2}$$

# Uczenie w czasie COVID

Later in this section, we will show examples of finding Taylor series and discuss conditions under which the Taylor series for a function will converge to that function. Here, we state an important result. Recall from Uniqueness of Power Series that power series representations are unique. Therefore, if a function $f$ has a power series at $a$, then it must be the Taylor series for $f$ at $a$.

example. Let $f(x) = \frac{3}{1-x}$

On the other hand,

**THEOREM 6.6**

**Uniqueness of Taylor Series**

If a function $f$ has a power series at $a$ that converges to $f$ on some open interval containing $a$, then that power series is the Taylor series for $f$ at $a$.

$3 + 3 \cdot x + 3 \cdot x^2 + \ldots$ is a geom. s. conv. for $-1 < x < 1$

The proof follows directly from Uniqueness of Power Series.

To determine if a Taylor series converges, we need to look at its sequence of partial sums. These partial sums are finite polynomials, known as **Taylor polynomials**.

and we have $\frac{3}{1-x} = 3 + 3 \cdot x + 3 \cdot x^2 + \ldots \frac{f^{(n)}(0)}{n!}$

**MEDIA**

# Nas też uczono w czasie COVID

QLT
quality learning & teaching

CSU

Certificate of Completion

Przemyslaw Kajetanowicz

Has successfully completed *Introduction to Teaching Online Using QLT* training, resulting in knowledge and skills to effectively develop blended and online courses.

QLT INTRODUCTION CSU

Ashley Skylar, Ph.D.
Quality Assurance Blended-Online Manager
CSU Academic Technology Services

June 28, 2020

Mary Bennett, MA
CSU QLT Program Manager
CSU Academic Technology Services

CSU The California State University

# Zadanie na pandemię

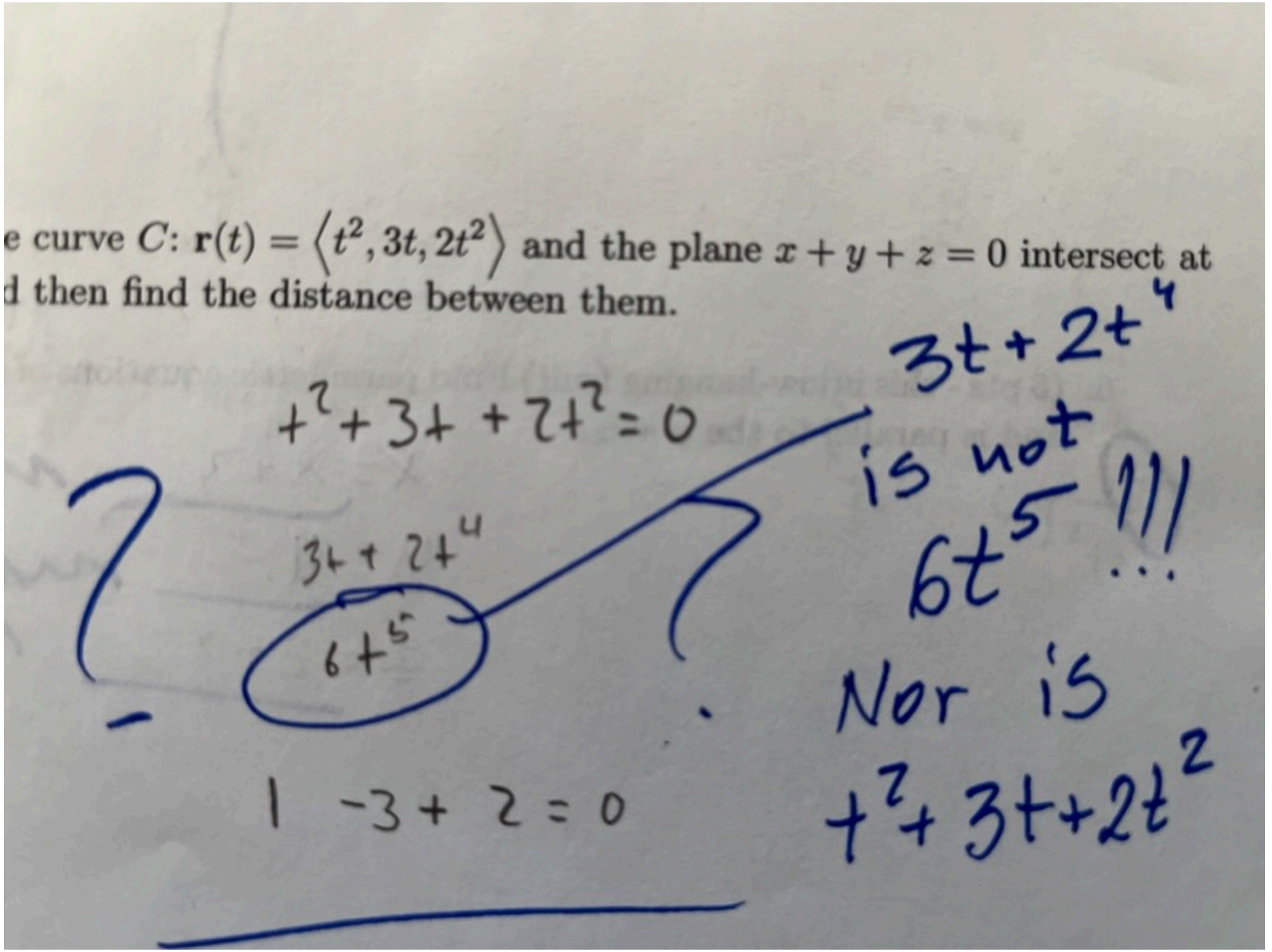
3. Let $p$ be a real number and let $f(x) = \dfrac{(p+3)(p+5)x+1}{2x^2+px+2}$. Use your knowledge on integrals of rational functions to answer part (a) and (b) below **without integrating the entire** $f(x)$. Carefully study the structure of $f(x)$ instead. You must clearly justify your reasoning. Feel free to use full sentences as needed.

   (a) (2 pts) Find the value(s) of $p$ such that the integral $\int f(x)dx$ involves the inverse tangent but does not involve the natural logarithm or any other non-constant functions.

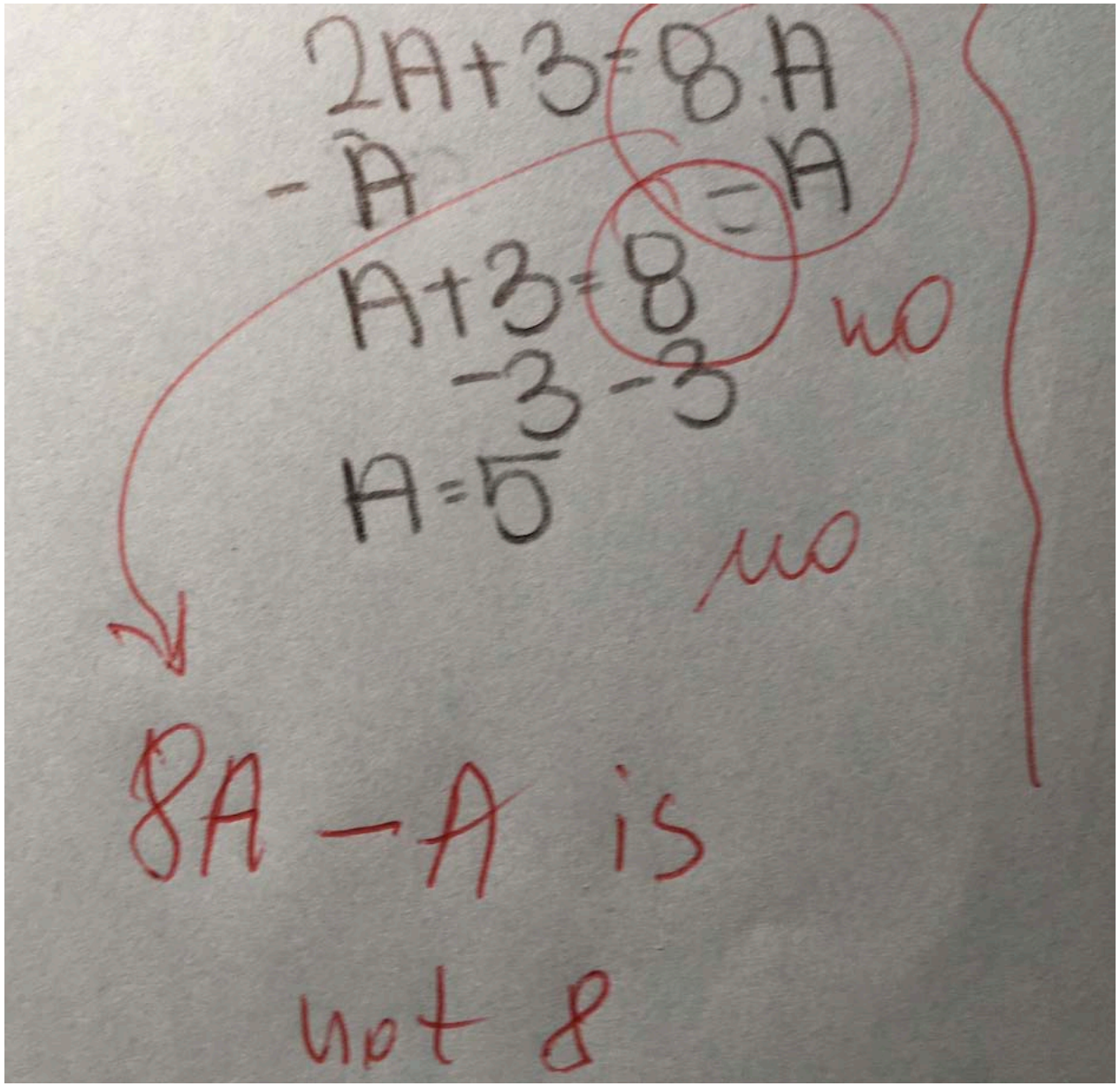
   (b) (3 pts) Find the value(s) of $p$ such that the integral $\int f(x)dx$ involves both the inverse tangent and the natural logarithm.

# Po pierwszym semestrze w COVID

# Druzgocące konsekwencje COVID?



# Druzgocące konsekwencje COVID?



# Jak nas oceniali studenci (formalny wymóg)

- The atmosphere in class invited students to seek additional help if needed.
- Students were encouraged to ask questions in class.
- The instructor checked on students' understanding during class.
- The instructor explained new ideas by relating them to familiar concepts.
- The instructor explained concepts clearly.
- The instructor used various activities that involved me in learning.
- Graded assignments were returned to me in a timely fashion.
- The class included multiple graded assignments.
- The class included multiple quizzes and/or exams.

# Jak nas oceniali studenci w Internecie

**2.5** / 5

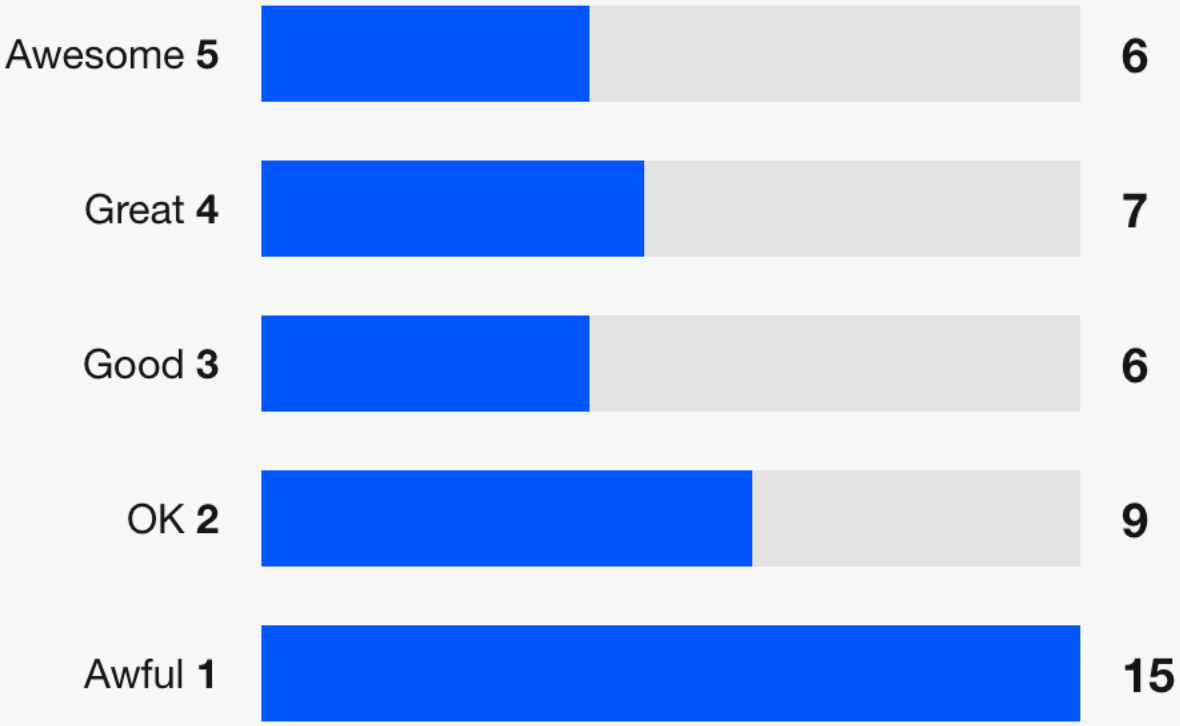
**Overall Quality Based on 43 ratings**

## Przemyslaw Ka-jetanowicz

Professor in the **Mathematics department** at **California State University Fresno**

| 40% | 4 |
|---|---|
| Would take again | Level of Difficulty |

**Rating Distribution**



# Rate my professor (Math 100)

This professor was the worst teacher I have ever had. He may be smart at math but has zero ideas on how to teach others this math. You are better off teaching yourself out of the textbook, so it does not become confusing. More than half of the class barely passed his course. Couldn't calculate our final grades without using excel. DO NOT TAKE! (1, grade C+)

This professor is inflexible and not capable of understanding that students have personal lives. i never have any idea what he is talking about in lectures and the textbook is not a good book for reference. expect to be confused all the time. (1, grade not disclosed)

# Rate my professor (Math 100)

Dr. PK is a good professor. He occasionally makes mistakes, yes, but that's a characteristic of all professors. Homework isn't too difficult and he gives you time to discuss with others before quizzes. Do not let the reviews on here scare you. He isn't nearly as bad as they make him sound. Would take again if I needed another math course. (4, grade A).

I was so scared to take this class with Dr. Pk bc of the reviews, but after taking MATH100 with him I realized that they were exaggerated. You have to work for your grade. He gives you plenty of chances to pass the class. Take notes, study them, do the hw, study for quizzes and exams and you will pass. Dr. Pk cares about his students, it is doable (4, grade B)

# Rate my professor (Math 77)

This professor is a really cool guy, but I can tell he has been doing his job for quite some time. I feel like he teaches in a way that assumes that you have genius IQ and not like someone who is learning the material for the first time. No curves on tests. And know this... Elementary= hardest topic in the world. (2,C)

One of the hardest math classes I've taken so far, and it absolutely didn't have to be. My calculus 1 & 2 professor provided us many examples of what problems may look like on the test. In this class it felt like he was trying trick us on the exams, as if math isn't hard enough. Overall, would never take a class with this professor again. (2, grade not yet given)

# Rate my professor (Math 77)

Dr. PK is one of the greatest professors of our modern age. Not only does he masterfully craft his lectures to perfection, but his in-class examples are second to none, divinely preparing students for exams. Whenever Dr. PK opened Geogebra, I felt something awaken inside of me. I'm not glazing; Dr. PK is just goated :3333. (5, A+)

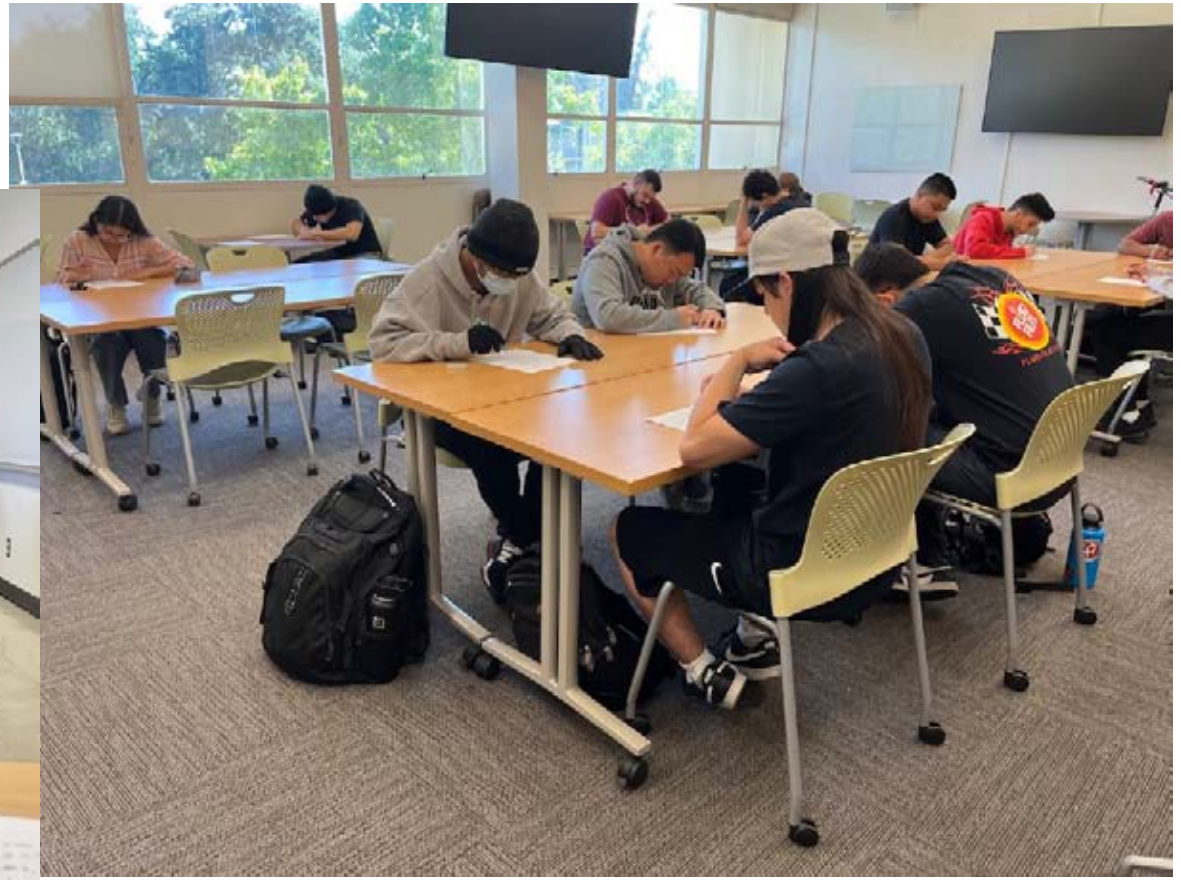
Dr Kajetanowicz is the best professor i have had at Fresno State so far. His lectures were amazing and kept you interested, and he was always willing to help before and after class. This class is extremely diffcult, but he makes it passable. His tests are pretty hard, but focus more on understanding then doing extremely hard problems. (5, A)

# Czym jeszcze zajmował się Math Department

- Department of Mathematics Day
- Math Field Day - Mad Hatter Marathon
- Integration Bee
- Graduation Dinner
- Beginning of Semester Party
- PK's Farewell Party

# Nie sposób nie wspomnieć o Michaelu

# Krzesełka i stoły...



# Tak mnie na koniec uhonorowali...