# Welcome To Math 34A! Differential Calculus


## Instructor:

Nathan Schley (*Sh+lye*), schley@math.ucsb.edu
South Hall 6701


## Office Hours:

T R 11-11:50, T 3:45-4:35 Details on Gauchospace.

Math 34A is about...

- Problem-solving using reasoning, algebra and arithmetic
- Turning English into Math (and vice versa)

Math 34A is not about...

- Memorizing formulas
- Rote computations

Here's a blog that explains this point well.
**Math with Bad Drawings: Just Memorizing**
Thankfully, we don't make very good robots.

# Do You Have An i>clicker?

A = Yes, B = No

# Everything Is On GauchoSpace

See https://gauchospace.ucsb.edu/

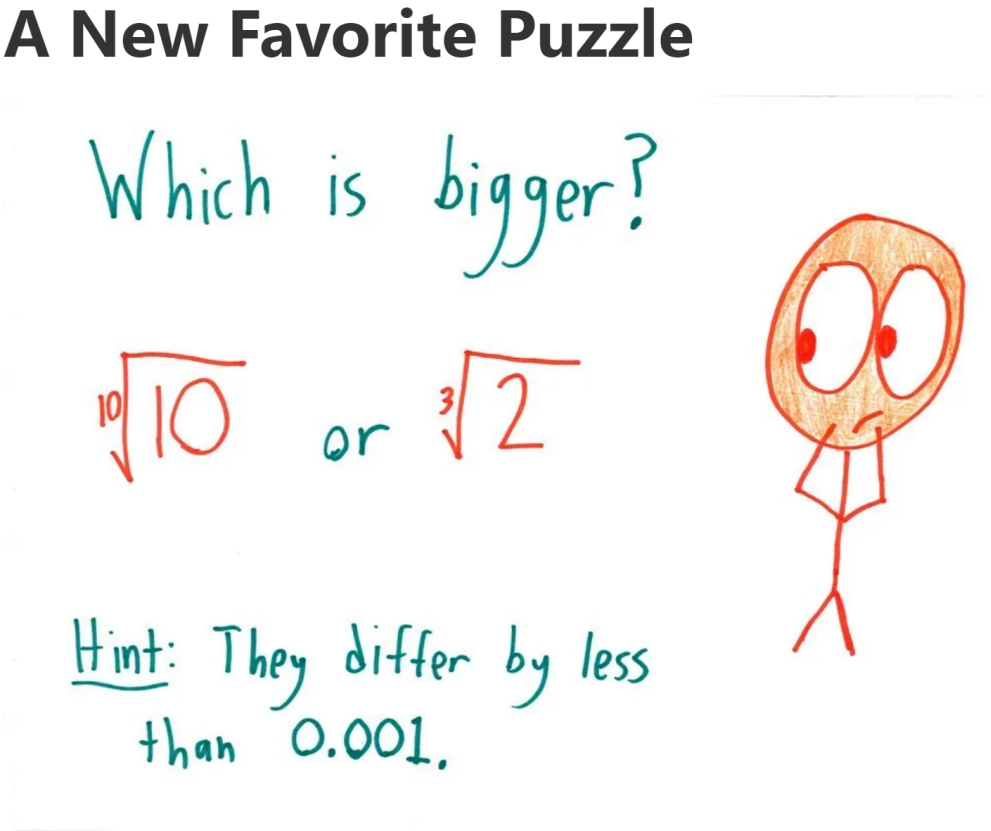
- Syllabus
- Homework:
  - On WeBWorK (link on GauchoSpace)
  - Due each lecture day before the end of the day
  - First one is due Thursday, Jan 6th!
- Dates of midterm exams and final exam.
  - First midterm is Jan 25! (Yikes!)
- Grading system
- Consider signing up with CLAS = Campus Learning Assistance Services – More info on Gauchocpase.

# Everything Is On GauchoSpace

See https://gauchospace.ucsb.edu/

- Purpose of the class: Solving new problems you haven't seen before.
  - Use reasoning, algebra and arithmetic.
  - This can get very difficult at times.
  - Memorizing formulas is tempting and seems easy, but it's actually harder long-term.
  - Word problems are the point.
- You should read the textbook!
  - It's quite good!
  - These lectures are not just presenting the textbook– they complement it.
  - Your homework problems are pulled from the textbook.
  - To be ready for exams you should follow both the textbook and the lectures.

# Example Puzzle




*(From Math with Bad Drawings)*

Idea: The number $2^{10} = 1024$ is often approximated to a "rounder" number to convey sizes with computer hardware.

# Let's Get Started!

**1.** Solve for $x$: $4x + 7 = 12$

A $= 3$ B $= 6$ C $= 5/4$ D $= 19/4$ E $=?$

Answer: C

**2.** Solve for $x$: $ax + b = c$.

A $= c/a$ B $= bc/a$ C $= (c+b)/a$ D $= c-b/a$ E $= (c-b)/a$

Answer: E

# More Problems!

**3.** Solve for $x$: $2x + 7 = ax + k$

A $= (2 - k)/(a - 7)$ B $= (k - 7)/(2 - a)$

C $= (k - 7)/(a - 2)$ D $= k - 7/a - 2$ E $=?$

Answer: B

**4.** Expand: $(1 - x)(1 + x + x^2)$

Moral: Parentheses are awesome!

# Word Problems!

**4.** The sum of three consecutive numbers is 99. What are the numbers?

Answer: $\boxed{32,\ 33,\ 34}$

**5.** Twice one number is three times another number. The sum of the two numbers is 110. What are the numbers?

Answer: $\boxed{66,\ 44}$

**6.** The perimeter of a rectangle is twice its area. Find a formula for the length of the rectangle in terms of its width.

Answer: $\boxed{L = \frac{W}{W-1}}$

# Introduction to Percentages

- cent means hundred
- percent means per hundred or out of one hundred.
- So 50% means 50 out of 100, or $\frac{50}{100}$, or .50

To convert a fraction to a percentage: multiply by 100%

Questions:

**1.** What is 3/4 as %?

$A = 0.75\%$ $B = 30\%$ $C = 7.5\%$ $D = 75\%$ D

**2.** What is 20% of 30?

$A = 600$ $B = 60$ $C = 6$ $D = 0.6$ C

# You Try It!

**3.** Click A,B,C,D as you do these problems

(A) What is 20% of $x$?

(B) What is 70% as a fraction?

(C) What is $x$% of 50?

(D) What is $\dfrac{x}{x+1}$ as %?

Answers: (A) $x/5$ (B) $7/10$ (C) $x/2$ (D) $\left(\dfrac{100x}{x+1}\right)\%$

How many did you get right?

$A = 4$☺ $B = 3$ $C = 2$ $D = 1$ $E =$ ☹

# Mixing Paint

**4.** If I combine 5 liters of blue paint with 15 liters of red paint, what percentage of red paint is in the combination?

$A$ 15% $B$ 5% $C$ 75% $D$ 25% $E$ Other C

**5.** If I combine $x$ liters of blue paint with $y$ liters of red paint, what percentage of blue paint is in the combination?

$$A\ \left(\frac{x}{x+y}\right)\% \quad B\ \left(\frac{y}{x+y}\right)\% \quad C\ \left(\frac{100y}{x+y}\right)\%$$

$$D\ \left(\frac{100x}{x+y}\right)\% \quad E \text{ Other} \qquad \boxed{\text{D}}$$

# One More Problem!

**6.** Express $x\%$ of 4 plus $y\%$ of 3 as a percentage of 12.

Idea: Break down the problem into simple steps in English. Explain what I'm doing to myself.

# That's it. Thanks for being here.