

INTRODUCTION TO CALCULUS

MATH 1A

Unit 0: Warm Up: due 1/22/2024

Problem 1.1: Algebra: Please simplify the following expressions

- a) $\frac{1}{\frac{1}{3}-\frac{1}{4}}$
- b) $(1/3)/(4/9)$
- c) $\sqrt{x^6}x/x^{-2}$
- d) $((2^4)^3) - (2^3)^4$
- e) $\ln(e^{10}e^{11})$.

Problem 1.2: Equations: Please solve the following equations for x .

- a) $x^2 + 1 = 2x$
- b) $\sin(x) = 1/2$
- c) $2^x = 1$
- d) $\tan(x) = \sin(x)$
- e) $\sqrt{x} + x = x\sqrt{x}$.

Problem 1.3: Graphing: Graph the following functions

- a) $f(x) = 3x + 2$
- b) $f(x) = 2^x - 5$
- c) $f(x) = x^3 - x$
- d) $f(x) = e^{-x^2}$
- e) $f(x) = \sin(2x) + 1$

Problem 1.4: Geometry: A triangle has side lengths 3, 4, 5.

- a) What is the largest angle in the triangle?
- b) What is the area of the triangle?
- c) What is $\arcsin(4/5)$?
- d) Solve the equation $\arctan(3/4) = \arcsin(x)$ for x .
- e) What is $\arccos(3/5) + \arcsin(3/5)$?

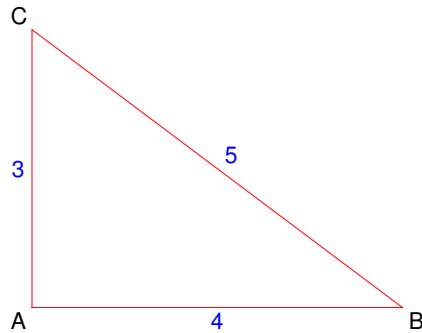


FIGURE 1. The 3-4-5 triangle.

Problem 1.5: Exponentials: Which of the following statements are true?

if $x + y = z$?

a) $2^x + 2^y = 2^z$

b) $2^x 2^y = 2^z$

c) $2^{x+y} = 2^z$

d) $x^2 + y^2 = z^2$

e) $\log_2(x) + \log_2(y) = \log_2(z)$

Problem 1.6: Modeling: You count 1000 bacteria of a colony today $t = 0$ and 32000 after $t = 5$ days. How many bacteria are there in 9 days?

Problem 1.7: Laws: a) Write down 3 laws for exponentiation.

b) Write down 3 laws for logarithms.

Problem 1.8: Definitions: Summarize the definitions for $\sin(x)$, $\cos(x)$, $\tan(x)$ and $\cot(x)$.

Problem 1.9: Triangles: There are 2 important special triangles for which all angles are known explicitly. What are these angles. (You should find 4).

Problem 1.10: Please check the syllabus if necessary:

a) What are the names of your instructors and CA's

b) Summarize the homework policies.

c) Is Chat GPT allowed in this course?

d) When are the midterm dates?

e) State the first sentence of the Harvard honor code.