

QUIZ 1A

(CHAPTER 0: PRELIMINARY TOPICS)
 MATH 141 – SPRING 2019 – KUNIYUKI
 90 POINTS TOTAL

No notes or books allowed. A scientific calculator is allowed. Simplify as appropriate.

Check one:

Can you easily print files from the class website?

Yes. I can print exam solutions.

No. Give me exam solutions in class.

You may assume that two-dimensional graphs are in the usual Cartesian xy -plane (distances in meters). Give exact answers, unless you are told to approximate.

SHORTER PROBLEMS (29 POINTS)

1) (1 point). The symbol \forall means which of the following? (Box in one.)

For all

There exists

Is a member of

2) (6 points total).

a) Write the **converse** of this given statement:

“If I finish ALEKS, then I get points.”

b) Write the **contrapositive** of this given statement:

“If I finish ALEKS, then I get points.”

c) Which is logically equivalent to the given statement? (Box in one.)

Its converse

Its inverse

Its contrapositive

3) (3 points). Simplify: $\frac{x(x+2)}{|x+2|}$ if $x < -2$.

4) (2 points). Mathematically express the following as an absolute value inequality: The distance between x and 3 on the real number line is less than 6.

5) (4 points). Solve the absolute value inequality from Problem 4); that is, solve the correct answer to Problem 4). Write the solution set in interval form (the form with parentheses and/or brackets).

6) (1 point). A student says that the expression $\sqrt{a^2 + b^2}$ is equivalent to $a + b$.
Is the student correct? Box in one: Yes No

7) (4 points). Write an equation for the line that passes through the point $(4, 5)$ and that is perpendicular to the line $y = \frac{7}{9}x - 10$. Your answer may be in Point-Slope Form.

8) (8 points total; 2 points each). Write the formulas for the following.

Description	Formula
The lateral surface area of a right circular cylinder with base radius r and height h	
The volume of a right circular cylinder with base radius r and height h	
The volume of a right circular cone with base radius r and height h	
The surface area of a sphere of radius r	

LONGER PROBLEMS (61 POINTS)

Show all work, simplify as appropriate, and use “good form and procedure” (as in class).
Box in your final answers!

9) (4 points). Simplify completely and fill in the box: $\frac{(7^{2n})(7^{9n})}{(7^n)^3} = 7^{\boxed{}}$

10) (6 points). Factor completely over \mathbb{Z} (using only integer coefficients), as in class, and write your final answer as a fraction with no negative exponents:
 $3x^{-2} + x^{-3} - 2x^{-4}$

11) (5 points). Simplify completely: $\frac{2-x}{x^3-8}$

12) (4 points). Fill in the boxes with real numbers in simplest form to make the statement correct.

$$\frac{7\sqrt{x} + 4}{x^2} = 7x \boxed{} + 4x \boxed{} \quad (x \neq 0)$$

13) Simplify the following expression completely, as in class.
Your final answer must be a single non-compound fraction with no nonpositive exponents. (You do not have to rationalize denominators.)
You may ignore domain issues here. (9 points)

$$\frac{\left(\sqrt[3]{x+2}\right)(4) - (4x)\left(\frac{1}{3}\right)(x+2)^{-2/3}}{(x+2)^{2/3}}$$

14) For parts a), b), and c) below, consider the points $P(2, -1)$ and $Q(6, 2)$ in the usual xy -plane. Write all numerical constants in simplest form. Distance is measured in meters. (19 points total)

a) Find the distance between the two points (that is, the length of the line segment \overline{PQ}).

b) Find the standard form of the equation of the circle that has $P(2, -1)$ as its center and that passes through the point $Q(6, 2)$ as a solution point. Hint: Part a) will help.

c) Find the Slope-Intercept Form of the equation of the line \overline{PQ} that passes through the two points P and Q . Hint: This part can be done without parts a) and b).

- 15) A spherical balloon has volume 300 cubic inches. Find the radius r of this balloon. Write an exact answer, and include appropriate units. (You do not have to rationalize denominators.) Also write an approximate answer in decimal form by rounding off to four significant digits. (8 points)
- 16) Find the **particular** model equation representing the following, as in class: w is directly proportional to p and inversely proportional to the square of q , where w is 9 when p is 4 and q is 5. Make sure your model is in simplified form; no compound fractions are allowed. (By “particular,” we mean determine the constant of proportionality.) (6 points)