

Math 125 Final Exam, Spring 2022

- The following exam has 4 parts, 18 problems and 8 pages. Please stop and make sure your exam has all its pages.
- Please raise your hand if you have any questions or need a restroom break.
- When you have completed your exam, please raise your hand for the instructor to collect it or deliver it to the instructor. DO NOT begin packing up until you have turned your exam in.
- ANY use of cell phones or electronics other than an appropriate calculator will result in a zero on the exam.
- ANY cheating (cheat sheets, communicating with classmates, etc.) will result in a zero on the exam.

Section 1: Quick problems. Show work to receive partial credit. Make sure you simplify fully and round appropriately.

1. [5] Complete the indicated operation and give your answer in scientific notation. Round appropriately as your final step:

$$(3.980 \times 10^{-8})(4.257 \times 10^{15})$$

2. [5] Simplify. Express results with positive exponents only:

$$\left(\frac{-5z^8}{z^2q^3}\right)^2$$

3. [7] Perform the following and simplify. Be sure to write your answer in the correct form.

$$(8x^2 + 7 + 6x) \div (x - 2)$$

4. [16] Factor each polynomial completely:

a. $12y^2 - 10y - 8$

b. $x^4 - 16$

c. $x^3 + 27$

Section 2: Graphing and calculations. Show all work to receive credit. Be sure to simplify.

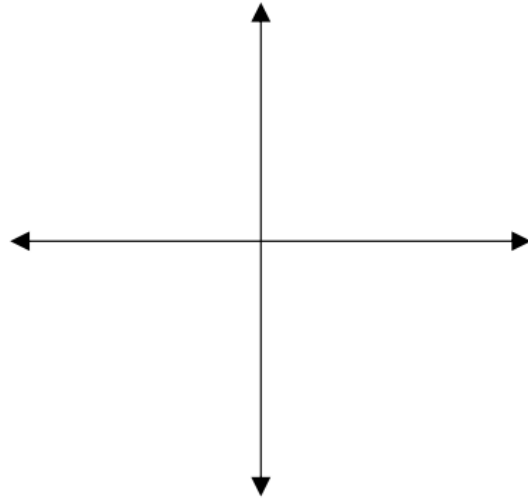
5. [10] Give the equation in slope-intercept form of the line that is perpendicular to

$y = -\frac{1}{3}x - 2$ and passes through the point (5,0):

6. [10] Consider the following function: $f(x) = \sqrt{4x + 3}$

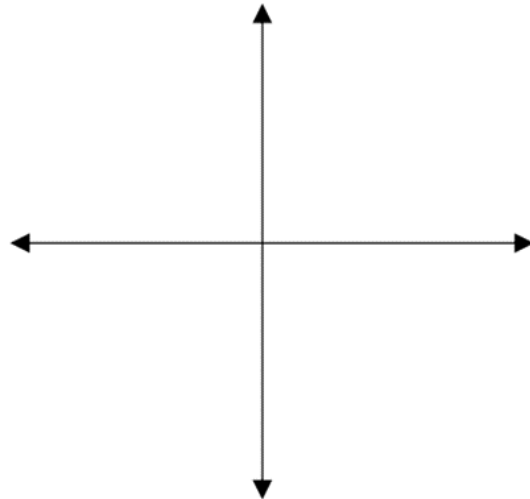
d. Find the domain of $f(x)$:

e. Graph $f(x)$ and **label** at least three points including the x-intercept:



7. [14] Find the **quadratic roots** and the **vertex** (both coordinates) and sketch the graph. Show all work in finding the x-intercepts and the vertex. You can use decimals for the vertex (x, y) coordinates. Label the roots and vertex on the graph.

$$y = x^2 - 9x + 14$$



8. [7] If y varies directly with x^2 and $y = 9$ when $x = 5$, find y when $x = 10$. Give an exact answer.

9. [9] Solve the system of equations:

$$4x = 7y + 2$$

$$3y = -2x - 8$$

10. [24] Solve the following equations for x . Give exact answers (no decimals):

a. $\frac{7}{3x} + \frac{1}{10} = \frac{2}{8x}$

lcd: _____

Solve the equations for x. Give exact answers (no decimals).

b. $x^2 - 2 = -5x$

c. $K = \frac{hx}{x+c}$

11. [7] Perform the indicated operations, factor, and reduce the following to the simplest form. You may leave your answer in factored form:

$$\left(\frac{x^2 - 9}{x}\right) \div \left(\frac{x + 3}{2x^2 - 14x}\right)$$

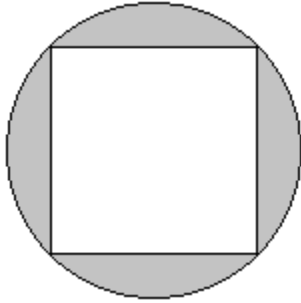
Section 3: Word problems. Show all work to receive credit. Be sure to use appropriate rounding and include units!

12. [12] A squirrel on the ground observes a bird feeder that he wants to raid, on a nearby post. If the post is 5 feet tall with the bird feeder at the top, and the angle of elevation from the squirrel to the bird feeder is 26.0° , how far is the squirrel from the base of the post? Round appropriately.

13. [12] The speed of a small plane is 165 mph in still air. With a head wind it makes a routine flight in 5.6 hours but the return trip along the same flight path with a tail wind takes 4 hours. What is the average wind speed? Round final answer to three significant digits.

Section 4: Geometry and Trig. Show all work to receive credit. Round appropriately or as indicated in the problem.

14. [10] Find the area between a circle and an inscribed square where the circle has a diameter of 18 cm. Round to three significant digits.



15. [12] Given three parts of a triangle, find the remaining three parts. Round off the length of sides to three significant digits and round off angles to the nearest $\frac{1}{10}$ of a degree.

$$C = 90^\circ, A = 38^\circ, b = 55 \text{ cm}$$

16. [12] A sector of a circle has a radius of 5.10 inches and an arc length of 1.20 inches. Find the measure of the central angle for this sector of the circle. Round to three significant digits.

17. A concrete patio is to be built as a regular octagon with a perimeter of 160 feet.

a. [12] Find the area of the regular octagon.

b. [2] If the concrete patio is to be 4.0 inches thick, how many cubic yards of concrete will be needed?

18. [14] Given $a = 73.6$ in, $B = 27^\circ$, and $C = 41^\circ$, find the three remaining parts of the oblique triangle. Round off side lengths to one decimal place.