

**Math 125 Final Exam, Spring 2018**

- The following exam has 4 parts, 21 problems, and 8 pages. Please stop and make sure that 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, raise your hand and the instructor will collect your exam. 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 you receiving a zero on your final exam.
- ANY cheating (cheat sheets, communicating with classmates, etc.) will result in you receiving a zero on your final 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:

a.  $2.1 \times 10^{-3} - 8.1 \times 10^{-4}$

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

a.  $\frac{(3xy^2)^{-3}}{-x^5y^4}$

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

a.  $(4x^3 + 7x - 1) \div (2x + 3)$

4. [15]Factor each polynomial completely:

a.  $2x^4 - 9x^3 + 10x^2$

b.  $x^4 - 81$

c.  $-x^3 + 8$

5. [5]Perform the indicated operation and simplify:

a.  $(4 - 3i)^2$

6. [5]Simplify and solve for x. Give an exact answer:

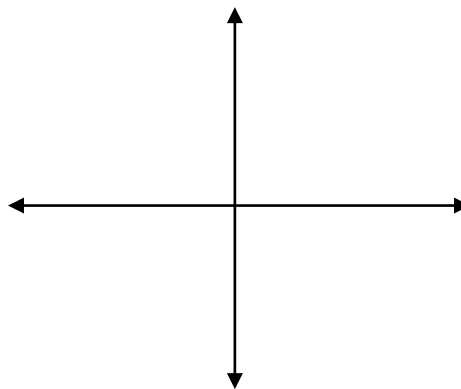
a.  $x = \log_3 \frac{1}{9}$

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

7. [9] Considering the following function:  $f(x) = \sqrt{1 - 3x}$

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

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



8. [10] Give the equation of the line in slope-intercept form which is perpendicular to the line  $2x - 4y = 7$  and passes through the point  $(-1, 3)$ .

9. [8]Solve the system of equations:

a. 
$$\begin{aligned} 4x-9y &= 5 \\ -12x+27y &= -15 \end{aligned}$$

10. [6]If  $y$  varies inversely as  $x^2$  and  $y=6$  when  $x=3$ , find  $y$  when  $x=5$ . Give an exact answer:

11. [6]Perform the indicated operations, factor, and reduce the following to simplest form. You may leave your answer in factored form:

a. 
$$\left(\frac{x^2-x}{3x+9}\right) \div \left(\frac{x^2-2x+1}{x^2-9}\right)$$

12. [20] Solve the following equations for  $x$ . Give exact answers:

a.  $\frac{1}{x+3} - \frac{3}{2x^2+6x} = \frac{5}{2x}$

b.  $y - x = 2ax$

c.  $2x^2 + 3 = 8x$



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

16. [10] Find the area of the following:

- a. The area between a circle and an inscribed square where the circle has radius 14.0 in. Round to three significant digits.

17. [12] Given the three parts of a triangle, find the remaining three parts. You may round off the length of sides to three significant digits and round off angles to the nearest  $1/10$  of a degree.

- a.  $C=90.0^\circ$ ,  $a=11.0^\circ$ ,  $c=14.0$  ft

18. [12] Find the area of a regular octagon with perimeter of 88.0 feet.

19. [8] Find the area of the sector of a circle that has a diameter of 10.0 cm and a central angle of  $115^\circ$ . Round to three significant digits.

20. [15] Given  $a=58.4\text{m}$ ,  $b=66.2\text{m}$ ,  $c = 27.1\text{m}$ , find the three remaining parts of an oblique triangle. You may round off the length of sides to the correct number of significant figures and round off angles to the nearest  $1/10$  of a degree:

Hint: Law of Sines:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ , Law of Cosines: 
$$\begin{cases} a^2 = b^2 + c^2 - 2bc(\cos A) \\ b^2 = a^2 + c^2 - 2ac(\cos B) \\ c^2 = a^2 + b^2 - 2ab(\cos C) \end{cases}$$

Hint: Find Angle A first.

21. [8] Sketch a graph of  $f(x) = 2\cos x - 1$ . Be sure to show at least one full period. Label the y-intercept and three other points.