- 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. $(3.1 \times 10^4)(6.2 \times 10^{-6})$

2. [5]Simplify. Express results with positive exponents only:
    a. $\left(\frac{-2x^3}{y^{-7}}\right)^{-1}$

3. [7]Perform the indicated operations and simplify. Be sure to write your answer in the correct form:
    a. $(7 + 12x - 9x^2) \div (3x - 1)$

4. [15]Factor each polynomial completely:
   a. $4x^2 - 45x + 11$

   b. $16x^4 - 1$

   c. $x^3 + 27$

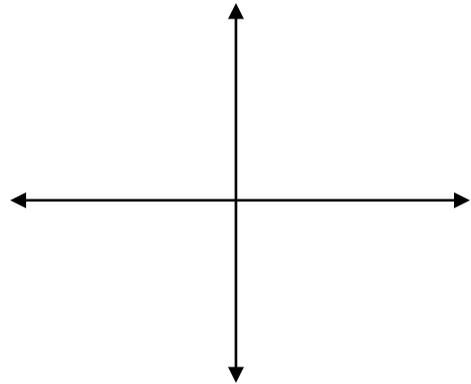5. [5]Perform the indicated operation and simplify:
   a. $(1 - 5i)(4 - i)$

6. [5]Simplify and solve for x. Give an exact answer:
   a. $x = log_8 2$

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

7. [9]Considering the following function: $f(x) = \sqrt{4 - 5x}$
   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 parallel to the line 8x-5y=3 and passes through the point (-2,0).

9. [8]Solve the system of equations:

   a. $\begin{array}{l} 8x-5y=17 \\ 12x+y=0 \end{array}$

10. [6]If y varies inversely with x^2 and y=14 when x=2, find y when x=6. 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. $\left(\dfrac{x^2-1}{-3x^2+x}\right) \div \left(\dfrac{x^2-3x-4}{-x^2+4x}\right)$

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

a. $\dfrac{1}{x-3} - \dfrac{4}{x+3} = \dfrac{7}{x^2-9}$

b. $x = 2 + xat$

c. $x^2 - 6x = 1$

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

13. [12]The velocity of a small plane is 156 mph in still air. With a tail wind, a check ride takes 4.50 hours. The return trip against the wind takes 6.00 hours. What is the average wind speed? Round to two decimal places.

14. [12]How many liters of a 28% acid solution must be mixed with a 10% acid solution to produce 5 liters of a 15% acid solution? Round to one decimal place.

15. [10]A flag pole that is 28.0 feet tall is creating a shadow on the ground that is 13.7 feet long. What is the angle of elevation from the end of the shadow to the sun? Round appropriately.

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 17.0in. 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°, a=45.2 ft, c=71.0 ft

18. [12]Find the area of a regular octagon with perimeter of 128.0 feet.

19. [8]Find the arc length of a sector of a circle with a central angle of 47.0° and a radius of 1.80 inches. Round to three significant digits.

20. [15]Given a=6150m, b=2250m, C = 17.8°, 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: $\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$, Law of Cosines: $\begin{cases} a^2 = b^2 + c^2 - 2bc(cosA) \\ b^2 = a^2 + c^2 - 2ac(cosB) \\ c^2 = a^2 + b^2 - 2ab(cosC) \end{cases}$

21. [8]Sketch a graph of $f(x) = 3cosx$. Be sure to show at least one full period. Label the y-intercept and three other points.