

**Answer all questions. No phones or calculators allowed. Show all work.
No credit for answers without work. Total Test points = 200.**

1. Simplify the following:
 - (a) (5 points) $\sqrt[3]{27v^3}$.
 - (b) (5 points) $\left(\frac{5x+10}{3}\right) \div \left(\frac{x+2}{2x}\right)$.
 - (c) (5 points) Compute $(-2 + 3i) \cdot (-3 + 5i)$. Write your answer as a complex number in standard form.
 - (d) (5 points) Compute $(2 + 3i) + (-4i)$. Write your answer as a complex number in standard form.
2.
 - (a) (10 points) The length of a rectangle is 5 yards longer than its width. If the perimeter of the rectangle is 42 yards, find its area.
 - (b) (10 points) Solve for x . $2x^2 + 7x - 15 = 0$.
3.
 - (a) (10 points) Solve for u . Simplify your answer as much as possible.
 $3u - 36 = -6(u - 3)$.
 - (b) (10 points) Solve for v : $|6v + 6| = 18$.
4.
 - (a) (10 points) The function f is defined by $f(x) = 3x - 7$. Find $f(2y + 3)$.
 - (b) The one-to-one function h is defined as $h = 4x - 1$. Find the following
 - i. (5 points) $h^{-1}(x)$
 - ii. (5 points) $(h \circ h^{-1})(-3)$
5.
 - (a) Answer the questions below about the quadratic function: $g(x) = -3x^2 - 24x + 15$.
 - i. (5 points) Does the function have a minimum or maximum value?
 - ii. (5 points) Where does the minimum or maximum value occur?
 - iii. (5 points) What is the function's minimum or maximum value?
 - (b) (5 points) If the graph of the function f defined by $f(x) = x^2 + 8$ is translated vertically downward by 3 units it becomes the graph of a function h . Find an expression for $h(x)$.
6.
 - (a) (5 points) Rewrite as an exponential equation: $\log_x \frac{1}{4} = -1$.
 - (b) (5 points) Rewrite as a logarithmic equation: $3^x = 27$.
 - (c) (10 points) Solve the following equation for x : $5 + \log_2(-3x) = 6$.

7. (a) (5 points) A loan program offers an interest rate of 4% compounded continuously. Assume no payments are made for three years. Write an equation for how much would be owed after three years on a loan of \$2000.
- (b) Suppose that the dollar value $V(t)$ of a certain house that is t years old is given by the following exponential function: $V(t) = 358,000(1.02)^t$.
- (5 points) Find the initial value of the house.
 - (5 points) Does the function represent growth or decay?
 - (5 points) By what percent does the value of the house change each year?
8. (a) (10 points) Calculate the distance between the points $(-3, 3)$ and $(-5, 0)$ in the coordinate plane.
- (b) (10 points) Find the x -intercept and y -intercept of the line: $5x - y = 15$.
9. (a) (10 points) Graph the line $y = 2x - 7$
- (b) (10 points) Graph the equation $f(x) = \sqrt{x+1} - 3$.
10. (a) (10 points) The equation of a circle is $x^2 + y^2 - 2x + 8y + 1 = 0$. Identify the radius and center. Then graph the circle.
- (b) (10 points) Find the midpoint of the line segment joining the points $(5, 3)$ and $(-3, 7)$.