

Name: _____ Total Possible Points = 140 Points
(Plus 10 pts Extra Credit ☺)

1a) Given $f(x) = \frac{7}{x+1}$ find $\frac{f(x+h) - f(x)}{h}$ $h \neq 0$ (10 Points)

1b) If $f(x) = 2x^2 - 7$, find and simplify $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$ (10 Points)

2) Find the Domain and Range of the following functions: (8 Points)

a) $f(x) = \sqrt{16 - x^2}$

b) $g(x) = \ln(\ln(x+6))$

Domain

Domain

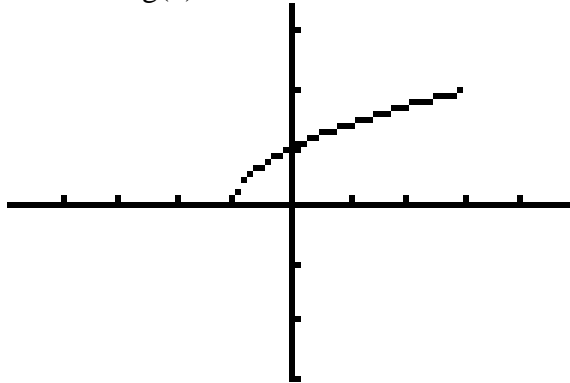
Range

Range

3) The graph of g is given.

(10 Points)

a) State the value of $g(0)$



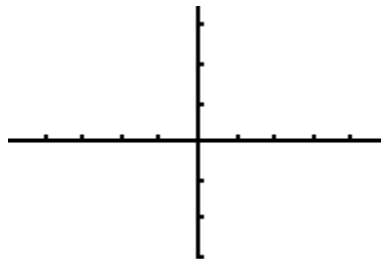
b) Why is g one-to-one?

c) Estimate the value of $g^{-1}(2)$?

d) Estimate the domain of $g^{-1}(x)$

e) Sketch the graph of $g^{-1}(x)$

4) Sketch the graph of the following function: $f(x) = \begin{cases} 1-2x & x < 0 \\ e^x - 1 & x \geq 0 \end{cases}$ (6 Points)



5) Find the equation of the exponential function of the form $y = Ca^x$ that passes through the points (2, 5) and (1, 15).

(10 Points)

6) Determine (**algebraically**) whether f is even, odd, or neither even nor odd (12 Points)

a) $f(x) = 3x^5 - 4x^2 + 3$

b) $f(x) = e^{-x}$

c) $f(x) = x^3 + \sin(x)$

d) $f(x) = x^4 + 2x^2$

7) Solve the following equations algebraically. (10 points)
(Must Show All the Appropriate Steps)

a) $\log x + \log(x+3) = 1 \square \square$

b) $\ln(3-x) - \ln(x+4) = \ln(2)$

8) If $f(x) = \ln(x+2)$, find $f^{-1}(-2)$ (5 Points)

9a) Sketch the curve represented by the parametric equation

$$x = t^2 \quad y = \ln(5t) \quad 1 \leq t \leq 5$$

And indicate with an arrow the direction in which the curve is traced as t increases.

(6 Points)

9b) Eliminate the parameter to find a Cartesian equation of the curve.

(3 Points)

9c) State the domain and range of the above graph.

(3 Points)

10) Let f be a one-to-one function whose inverse function is given by the formula:

(12 points)

$$f^{-1}(x) = x^5 + 3x^3 + 2x$$

a) Compute the value of y such that $f^{-1}(y) = 6$

b) Compute $f^{-1}(-2)$

c) Compute $f(326)$

d) Compute the value of x such that $f(x) = 1$

11) SOLVE for X (ALGEBRAICALLY)

(20 Points)

(You must show work for full Credit)

Show work & don't forget to check your answers!!

a) $\log_4(2x + 6) = \frac{1}{2}$

b) $4^x - 9 = 15$

c) Solve by the quadratic formula: $x^2 + 11 = 7x$

d) Solve by factoring: $2x^2 - x = 15$

e) Solve for x Algebraically $\sqrt{3x - 3} - 4 = 2$

12) Given $x + (y - 1)^2 = 0$

a) Find an expression for the function whose graph is the bottom half of the above (7 Points)

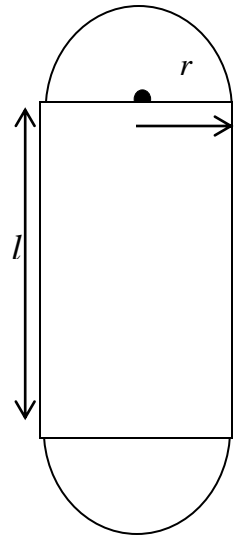
b) State the domain of the bottom half of the above parabola (3 Points)

c) State the range of the bottom half of the above parabola (3 Points)

d) Is the following a function? $x + (y - 1)^2 = 0$ (2 Points)

(Extra Credit 5 Points)

17) A field has the shape of a rectangle with a semicircle at each end. The length of the rectangular portion of the field is l , and the radius of each semicircle is r . If the outside perimeter of the field is 250 meters, express the **area** of the field as a function of r and simplify your answer.



(Extra Credits:

14a) Solve the following equation algebraically.

(4 points each)

$$e^{5-3x} = 10$$

14b) Express $\ln a + \frac{1}{2} \ln b - \ln c$ as a single logarithm