

Math 105 Exam 3 April 12, 2007
Chapters 2.7 – 3.5

Name _____ Instructor name or section # _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	EC	total
8	9	4	6	5	6	6	10	8	4	4	12	3	4	11	3	100

Given: Standard form for a quadratic: $y = a(x - h)^2 + k$, QF: $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Standard form for a circle: $(x - h)^2 + (y - k)^2 = r^2$, General form of a circle: $x^2 + y^2 + bx + cy + d = 0$

midpoint = $\left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$, distance formula: $d = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$,

Odd (origin symmetry): $f(-x) = -f(x)$, Even (y-axis symmetry): $f(x) = f(-x)$

Show All Work for Full Credit!!

1. Given $f(x) = \frac{9}{x-3}$, $g(x) = \frac{9}{x} + 3$ a.) (3 pts) Showing work find $f(g(x))$

$f(g(x)) =$ _____

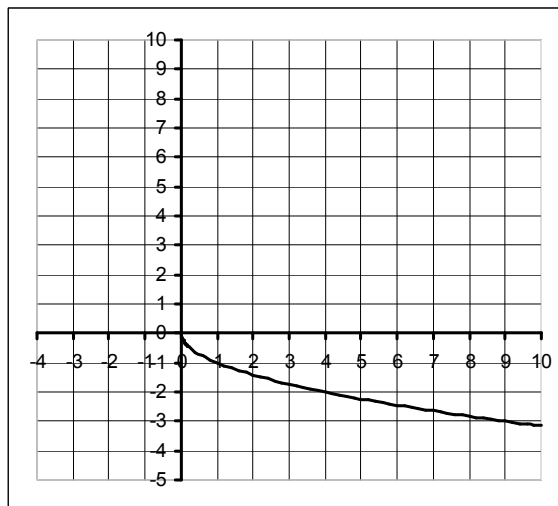
b.) (2 pts) True or False f and g are inverses

c.) (3 pts) The function $h(x) = 3x + 2$ is one to one. Find $h^{-1}(x)$

2. (3 pts ea) Given the graph of $f(x) = -\sqrt{x}$ sketch $f^{-1}(x)$ on the same graph. Using the graph and interval or set notation, give the domain and range of $f^{-1}(x)$.

domain: _____,

range: _____



3. (4 pts) Write the standard form of the equation of the circle with the given center and radius. Center $(6, -8)$, $r = 8$

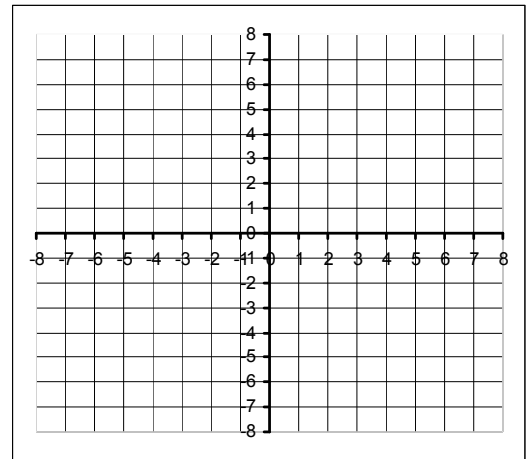
4. (3 pts ea) Find the midpoint of the line segment with the given endpoints and the distance between the endpoints $(-7, -2)$, $(-5, -8)$

midpoint is _____

distance = _____

5. (5 pts) a.) Complete the square and write the equation of the circle in standard form.

$$x^2 - 8x + y^2 - 9 = 0$$



Std form equation: _____

b.) Now use the center and radius to sketch the circle

6. (3 pts ea) True or False The following functions are polynomials. If true, indicate the degree:

a.) $f(x) = x^{1/2} + 3x^3$ True False degree _____

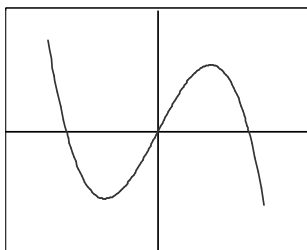
b.) $g(x) = -6x + x^2$ True False degree _____

7. (3 pts ea) Use the end behavior to connect each polynomial with a possible graph.

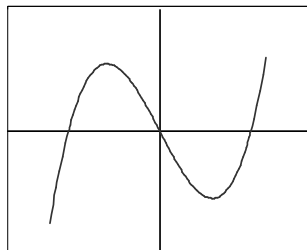
I.) $f(x) = 15x^{10} + 180x$

II.) $g(x) = x - 197x^7$

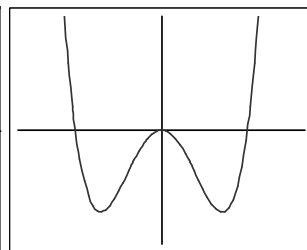
a.



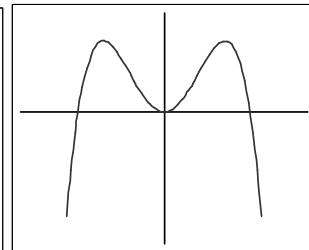
b.



c.



d.



8. (2 pts ea) Given $f(x) = -8x^2(x^2 - 144)$, what are the x-intercepts? $x =$ _____

Which x-intercepts cross the x-axis? _____, which x-intercepts touch and turn? _____,

what is the y-intercept? $y =$ _____. Which is a possible graph from #7 above (a, b, c, d)

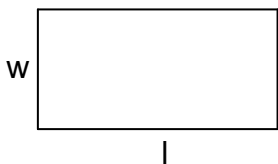
9. (4 pts ea) Find the x-value of the vertex and describe whether it would be a minimum or a maximum. a.) $f(x) = -8(x - 4)^2 - 152$, vertex x value = _____ circle one min OR max

b.) $x^2 - 13x + 288$, vertex x value = _____ circle one min OR max

10. (4 pts) State the quotient and the remainder $f(x) = 6x^3 + 8x^2 - 10x - 8$ divided by $(2x - 2)$.

Quotient _____ remainder _____

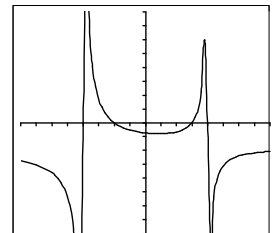
11. (4 pts) David has 720 yds of fencing to make a rectangular corral. Express the area ($A = w \cdot l$) as a function of w only, by using the equation for the perimeter. Find the value of w that gives the greatest area. (Show work, guess and check will receive no credit.)



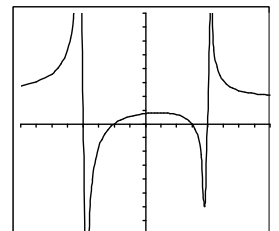
$A(w) =$ _____

$w =$ _____

12. (12 pts) Given $f(x) = \frac{x^2 - x - 6}{x^2 - 16}$, give: y-intercept if any _____,
x-intercepts if any _____, vertical asymptotes if any, $x =$ _____,



horizontal asymptotes if any, $y =$ _____, $f(-1) =$ _____.



circle the correct graph.

Based on the graph, is this function odd, even or neither? (circle one)

13. (3 pts) Use division (and the Remainder Theorem) to find $f(6)$ if $f(x) = 3x^3 - 9x^2 - 10x + 5$

14. (4 pts) Use division (and the Factor theorem) to find two factors if $x = -10$ is a zero of $f(x)$.
 $f(x) = x^3 + 14x^2 + 34x - 60$.

The two factor's of $f(x)$ are _____

15. (11 pts) Use the graph of the rational function, $f(x)$, to complete the following:

a.) What is the horizontal asymptote?

$y =$ _____

b.) What are the vertical asymptotes?

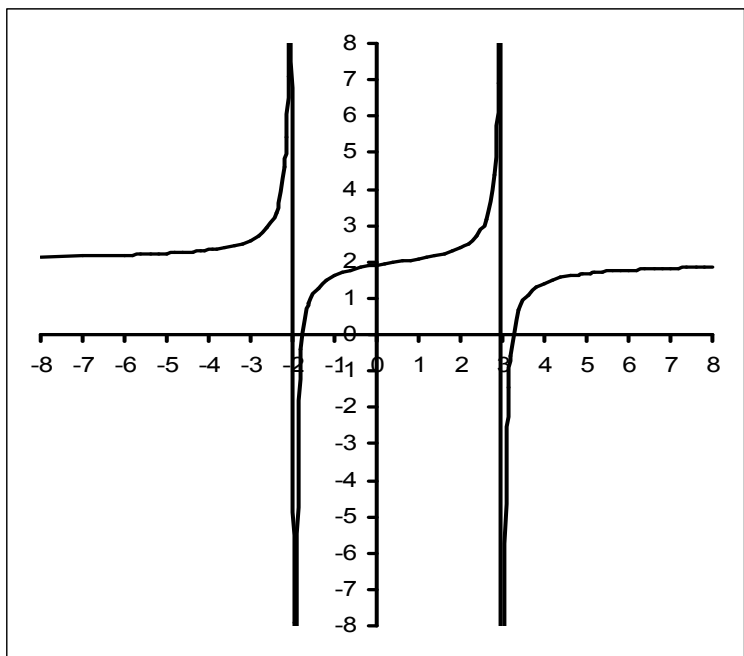
$x =$ _____

c.) As $x \rightarrow 3^+$, $f(x) \rightarrow$ _____

d.) As $x \rightarrow -2^-$, $f(x) \rightarrow$ _____

e.) As $x \rightarrow -\infty$, $f(x) \rightarrow$ _____

f.) As $x \rightarrow \infty$, $f(x) \rightarrow$ _____



E.C. (3 pts) [Note: In calculus if $f(x) = \frac{-x^{-2}}{(x-1)^3}$, then its derivative is

$f'(x) = \frac{2x^{-3}(x-1)^3 + 3x^{-2}(x-1)^2}{(x-1)^6}$] Find the zeros (x-intercepts) of $f'(x)$. $x =$ _____