

Math 105 Exam 3 November 16, 2006
Chapters 2.6 – 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	4	5	10	11	3	6	6	7	4	12	4	4	8	8	3/2	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!!

Show domains of functions in set builder, $\{x|x \text{ _____}\}$, or interval notation, (a, b).

1. (2 pts ea) For $f(x) = \sqrt{x}$ and $g(x) = x - 3$,

a.) show fg domain of fg

b.) show $\frac{f}{g}$ domain of $\frac{f}{g}$

2. (2 pts ea) Given $h(x) = (f \circ g)(x)$ where $h(x) = \sqrt[5]{x^3 - 4}$ show

$f(x) = \text{_____}$, $g(x) = \text{_____}$

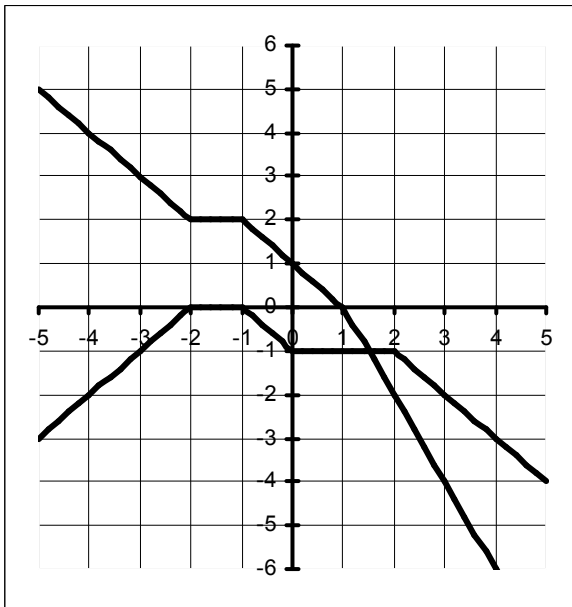
3. Complete the square (3 pts) and write the equation of the circle in standard form. Indicate the center and the radius. $x^2 + y^2 - 4y + 2 = 0$

(1 pt ea) center (____,____) radius _____

circle eqn: _____

4.

f



g

(2 pts ea) Use graphs of f and g to find:

a.) $(f + g)(3) = \underline{\hspace{2cm}}$

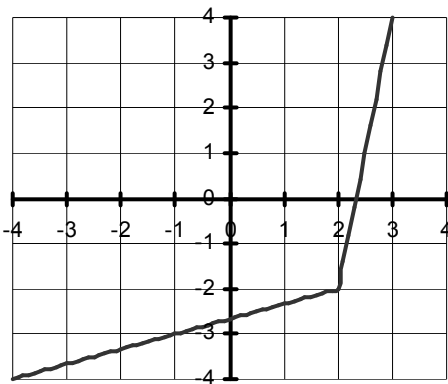
b.) $\left(\frac{g}{f}\right)(-1) = \underline{\hspace{2cm}}$

c.) $(f \circ g)(-4) = \underline{\hspace{2cm}}$

d.) $f^{-1}(-2) = \underline{\hspace{2cm}}$

e.) if $g(x) = -2$, then $x = \underline{\hspace{2cm}}$

5. (11 pts) The graph of $f(x)$ is shown. Use this graph to draw the graph of its inverse function on the same axis (3 pts). Indicate the domain and range of both functions. (2 pts ea)



a.) Domain of $f(x)$ $\underline{\hspace{2cm}}$

b.) Range of $f(x)$ $\underline{\hspace{2cm}}$

c.) Domain of $f^{-1}(x)$ $\underline{\hspace{2cm}}$

d.) Range of $f^{-1}(x)$ $\underline{\hspace{2cm}}$

6. (3 pts) Write the standard form of the equation of the circle with the given center and radius. Center $(-3, -4)$, $r = \sqrt{2}$

7. (3 pts ea) The diameter of a circle has endpoints $(4, 4)$, $(6, 8)$. Find the radius and center.

center: $\underline{\hspace{2cm}}$, radius: $\underline{\hspace{2cm}}$

8. (2 pts ea) Find the vertex and intercepts of $f(x) = (x - 2)^2 - 4$

Vertex _____

x-intercepts $x =$ _____

y-intercepts $y =$ _____

9. Find the vertex (3 pts), the axis of symmetry and describe whether the vertex is a maximum or a minimum (2 pts ea) $f(x) = x^2 - 50x + 127$.

Vertex _____

Axis of symmetry as an equation _____

min or max?

10. (4 pts) Among all pairs of numbers whose difference is 20, find the pair whose product is as small as possible. Let x be the first number. (use algebra -- no work, no points)

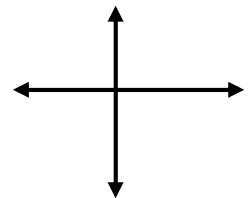
The two numbers are _____

What is the product? _____

11. Given $f(x) = -2(x + 4)^2(x^2 - 1)$

(2 pts) End behavior: "U" facing up, function increasing at left and at right, "U" facing down, function decreasing at left and at right

x-intercepts (1 pt ea) (may be extra spaces)	behavior at intercepts (1 pt ea) pass through or touch and turn



(2 pts) y-intercept _____

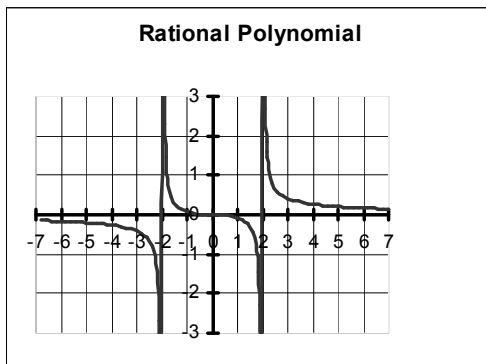
(2 pts) Odd, Even, Neither (draw a rough sketch if you want)

12. (4 pts) Use division and the Remainder Theorem to find $f(1)$ if $f(x) = 4x^3 - 12x^2 + 7x - 3$

13. (4 pts) Use division to solve the equation $x^3 + 2x^2 - 5x - 6 = 0$ given that 2 is one zero.

The three zero's are _____

14. (2 pts ea) Use the graph of the rational function, $f(x)$, to complete the following:



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

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

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

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

15. 2 pts ea) Find intercepts and vertical and horizontal asymptotes, if any, of $g(x) = \frac{10x^2}{2x^2 - 8}$

a.) The x-intercept/s are $x =$ _____ b.) Vertical asymptotes: $x =$ _____

c.) The y-intercept is $y =$ _____ d.) Horizontal asymptotes: $y =$ _____

E.C. Complete only one of the two E.C. or the lower will be graded. Circle your choice. **A.** (3 pts) Write the equation of a rational function, $f(x)$, having the indicated properties in which the powers of x are as small as possible. f has a vertical asymptote at $x = 1$, a slant asymptote whose equation is $y = 2x$, y-intercept at 4, and x-intercepts at -1 and 2 . **OR B.** (2 pts) If $f(2) = 6$ and f is one-to-one, find x such that $8 + f^{-1}(x - 1) = 10$