

Intermediate Calculus
Parent Functions

Quiz

Name _____

Block _____ Date _____

Name the function and graph.

cubic

1) $y = x^3$

square root

2)

2) $y = \sqrt{x}$

absolute value

3) $y = |x|$

4) $y = x^2$

quadratic

4)

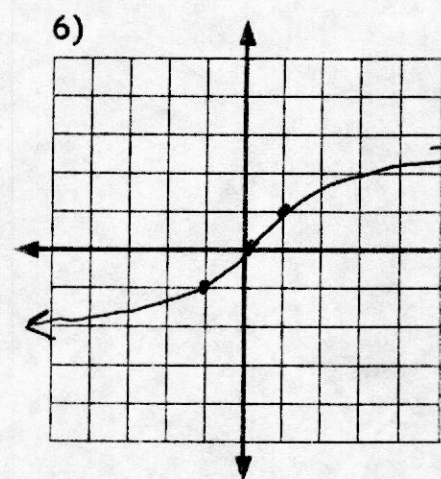
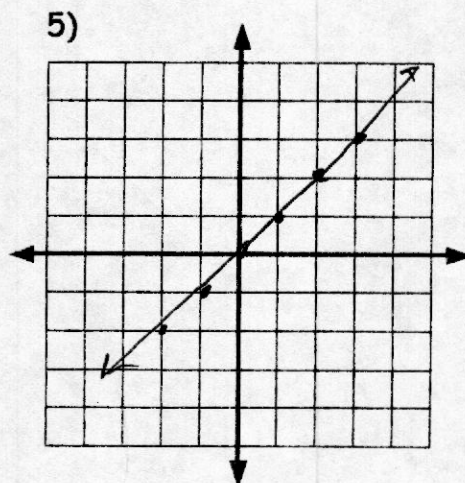
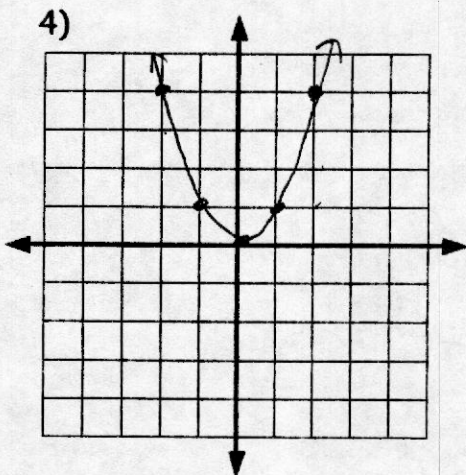
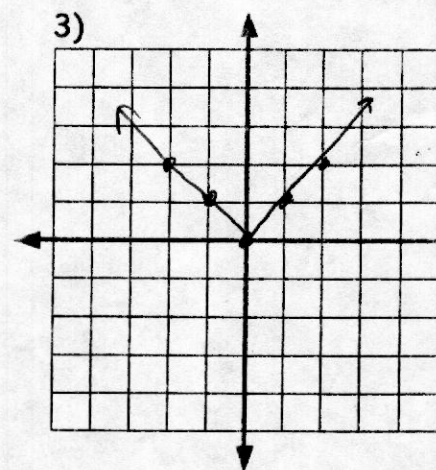
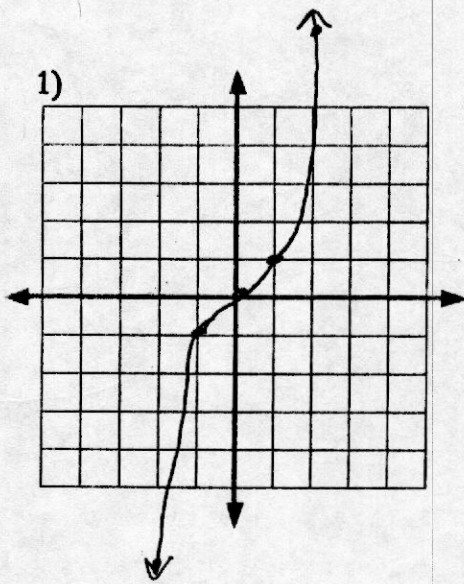
linear

5) $y = x$

6) $y = \sqrt[3]{x}$

Cuberoot

6)



NO CALCULATORS!!

8 each

Given $f(x) = 3x - 4$, $g(x) = x^2 - 4$, $n(x) = \sqrt{x}$, $k(x) = |x|$, $t(x) = x + 2$

Find the following.

$3x - x^2$ 1) $f(x) - g(x)$ $(3x - 4) - (x^2 - 4) = 3x - 4 - x^2 + 4$

2 2) $k(-2)$

$3x^2 + 2x - 8$ 3) $t(x) \cdot f(x)$ $(x + 2)(3x - 4) = 3x^2 - 4x + 6x - 8 = 3x^2 + 2x - 8$

$x^2 + x - 2$ 4) $g(x) + t(x)$

$x^2 - 4 + x + 2$

$h^{-1}(x) = 3x + 6$ 5) Find the inverse for the function $h(x) = \frac{x}{3} - 2$

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

$h^{-1}(x) = (x - 3)^3$ 6) Find the inverse for the function $h(x) = \sqrt[3]{x} + 3$

$h^{-1}(x) = (x - 3)^3$

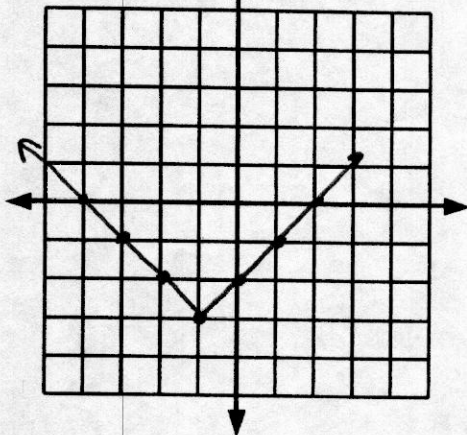
3 7) $n(t(7))$

$3x^2 - 14$ 8) $f(g(x))$ $3(x^2 - 4) - 4 = 3x^2 - 12 - 4$

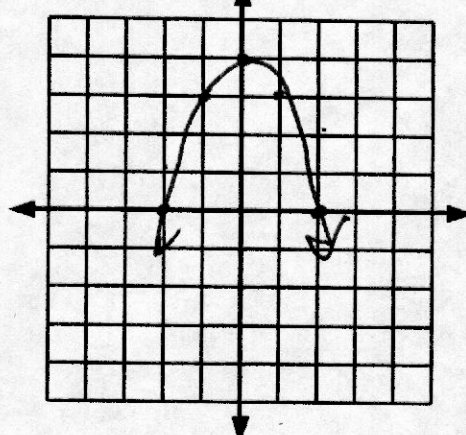
$x^2 + 4x$ 9) $g(t(x))$ $(x + 2)^2 - 4 = x^2 + 4x + 4 - 4$

$|3x - 4|$ 10) $k(f(x))$

14) $g(x) = |x + 1| - 3$



15) $n(x) = -x^2 + 4$



Graph the following:

1) Find the x- and y-intercepts

$(0,0) (2,0) (-2,0) (0,0)$

a) $y = x^3 - 4x$

x-int

y-int

$$\begin{aligned} 0 &= x^3 - 4x \\ 0 &= x(x^2 - 4) \\ &= x(x-2)(x+2) \end{aligned}$$

$(-3,0) (0, \pm\sqrt{3})$

b) $x = y^2 - 3$

$$0 = y^2 - 3 \quad y^2 = 3 \quad y = \pm\sqrt{3} \quad x = -3$$

2) Find the equation of the circle with the following conditions.

$(x-2)^2 + (y+1)^2 = 16$ a) C:(2,-1); r:4

$(x+1)^2 + (y-2)^2 = 20$ b) C:(-1,2) passing through the point (3,4)

$$\begin{aligned} r &= \sqrt{(3+1)^2 + (4-2)^2} \\ &= \sqrt{4^2 + 2^2} \\ &= \sqrt{16 + 4} \\ &= \sqrt{20} \end{aligned}$$

3) Give the center and radius for the following circles:

$C(2,-5) r = \sqrt{6}$ a) $(x-2)^2 + (y+5)^2 = 6$

$C(0,3) r = 5$ b) $x^2 + (y-3)^2 = 25$

4) Find the graphing form for the following circles:

$(x-1)^2 + (y+3)^2 = 25$ a) $x^2 + y^2 - 2x + 6y - 15 = 0$

$$x^2 - 2x + 1 + y^2 + 6y + 9 = 15 + 1 + 9$$

$$(x-1)^2 + (y+3)^2 = 25$$

$(x-\frac{1}{2})^2 + (y+\frac{1}{4})^2 = \frac{9}{16}$ b) $4x^2 + 4y^2 - 4x + 2y - 1 = 0$

$$4x^2 - 4x + 4y^2 + 2y = 1$$

$$4(x^2 - x + \frac{1}{4}) + 4(y^2 + \frac{1}{2}y + \frac{1}{16}) = 1 + 1 + \frac{1}{4}$$

5) Find the point(s) of intersection of the following graphs.

$(2,1) (-1,-2)$ a) $x^2 = 3 + y \quad x - y = 1$

$$4\left(\frac{x-\frac{1}{2}}{4}\right)^2 + 4\left(\frac{y+\frac{1}{4}}{4}\right)^2 = \frac{9}{4}$$

$(0,0) (\sqrt{2}, \sqrt{2}) (-\sqrt{2}, -\sqrt{2})$ b) $y = x^3, 2x = y$

$y = x^3$
 $y = 2x$

$x^2 = 3 + x - 1$

$x^2 - x - 2 = 0$

$2x = x^3$
 $x^3 - 2x = 0$
 $x(x^2 - 2) = 0$

$x = 0 \quad x = \pm\sqrt{2}$
 $y = 1$
 $y = -2$

$(x-2)(x+1) = 0$
 $x = 2 \quad x = -1$

Find the slope of the line passing through the pair of points.

$m = -\frac{7}{5}$ 1)

$(3, -1), (-2, 6)$ $m = \frac{6+1}{-2-3} = \frac{7}{-5}$

undefined 2)

$(3, 3), (3, -6)$ $m = \frac{-6-3}{3-3} = \frac{-9}{0}$

Find the slope and y-intercept of the equation of the line.

$m = \frac{3}{4}$ y-int: $(0, \frac{15}{4})$ 3)

$3x - 4y = 15$ $-\frac{4y}{-4} = \frac{-3x+15}{-4}$

$y = \frac{3}{4}x - \frac{15}{4}$

$m = 0$ y-int: $(0, -3)$ 4)

$y + 3 = 0$
 $y = -3$

Write the equation of the line that passes through the points.

$y - 2 = -\frac{4}{3}(x - 2)$ 5)

$(-1, 6), (2, 2)$ $m = \frac{2-6}{2+1} = \frac{-4}{3}$

$y - 4 = -\frac{1}{4}(x + 2)$ 6)

$(-2, 4), (10, 1)$ $m = \frac{1-4}{10+2} = \frac{-3}{12} = \frac{-1}{4}$

Find the equation of the line that passes through the given point with the given slope.

$y = -4$ 7)

$(-1, -4), m = 0$

$y - 7 = 3(x + 2)$ 8)

$(-2, 7), m = 3$

Write the equations of the lines through the given point (a) Parallel to the given line and (b) perpendicular to the given line

(a) $y - 2 = 3(x + 3)$

(b) $y - 2 = -\frac{1}{3}(x + 3)$ 9)

$(-3, 2)$ $6x - 2y = 3$

$-\frac{2y}{-2} = \frac{-6x+3}{-2}$
 $m = 3$

(a) $x = -2$

(b) $y = 3$ 10)

$(-2, 3)$ $x = 4$

1.4

NO CALCULATORS!!

Given $f(x) = 3x - 4$, $g(x) = x^2 - 4$, $n(x) = \sqrt{x}$, $k(x) = |x|$, $t(x) = x + 2$

Find the following.

$$\underline{3x - x^2} \quad 1) \quad f(x) - g(x) \quad (3x - 4) - (x^2 - 4) = 3x - 4 - x^2 + 4$$

$$\underline{2} \quad 2) \quad k(-2)$$

$$\underline{3x^2 + 2x - 8} \quad 3) \quad t(x) \cdot f(x)$$

$$\underline{x^2 + x - 2} \quad 4) \quad g(x) + t(x)$$

$$\underline{h^{-1}(x) = 3x + 6} \quad 5) \quad \text{Find the inverse for the function } h(x) = \frac{x}{3} - 2$$

$$\underline{h^{-1}(x) = (x - 3)^3} \quad 6) \quad \text{Find the inverse for the function } h(x) = \sqrt[3]{x} + 3$$

$$\underline{3} \quad 7) \quad n(t(7))$$

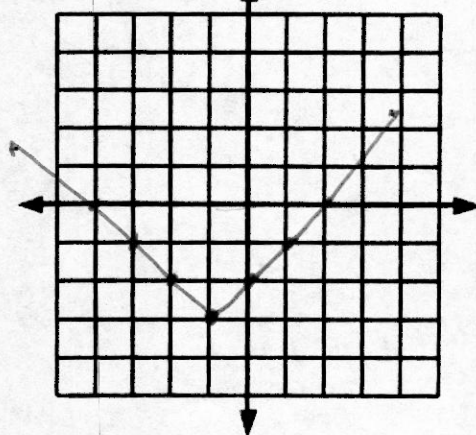
$$\underline{3x^2 - 16} \quad 8) \quad f(g(x))$$

$$\underline{x^2 + 4x} \quad 9) \quad g(t(x))$$

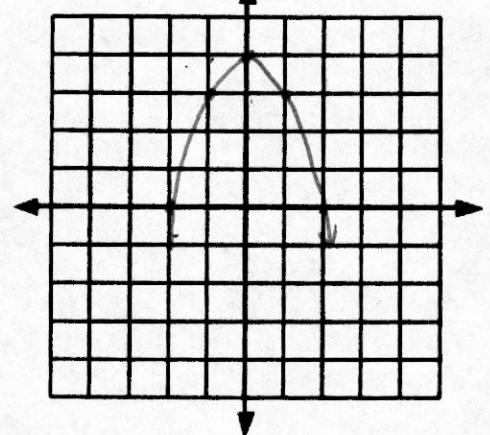
$$\underline{|3x - 4|} \quad 10) \quad k(f(x))$$

Graph the following:

14) $g(x) = |x + 1| - 3$



15) $n(x) = -x^2 + 4$



Intermediate Calculus
Rational Functions

Quiz

Name _____

Complete the following:

1) $f(x) = \frac{x^2 - 1}{x^2 - x - 6}$
 $(x-3)(x+2)$

$(\pm 1, 0)$ a)

x-intercepts

$(0, \frac{1}{6})$ b)

y-intercepts

$x=3, x=-2$ c)

VA

$y=1$ d)

HA

\mathbb{R} except $3, -2$ e)

Domain

_____ f)

Range

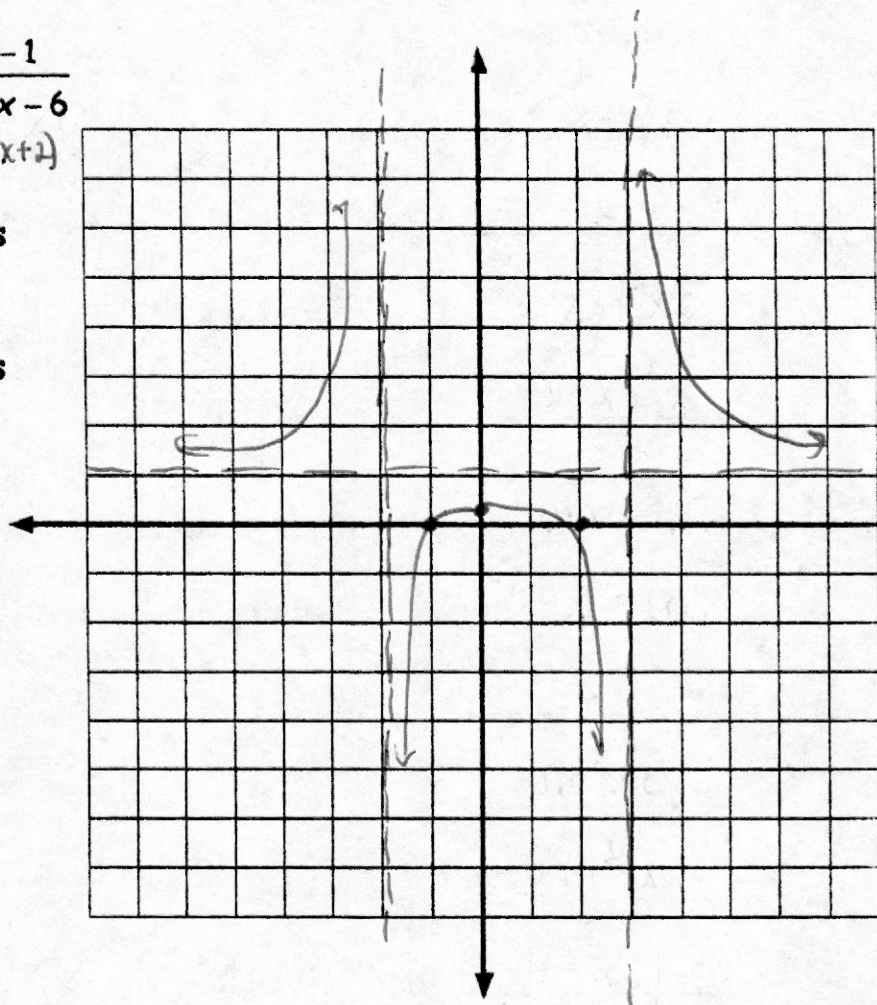
As $x \rightarrow \infty, f(x) \rightarrow$ 1

g)

As $x \rightarrow -\infty, f(x) \rightarrow$ 1

h) Sign Analysis

i) Graph



Find the Derivative

$$f'(x) = \frac{4(4x+1)(2x^2+x-4)^3}{(x+3)^2} \quad 1)$$

$$f'(x) = \frac{3}{(x+3)^2} \quad 2)$$

$$f'(x) = \frac{1}{\sqrt{2x-3}} \quad 3)$$

$$f'(x) = \frac{-8}{(2x-1)^2} \quad 4)$$

$$f'(x) = \frac{1}{\sqrt{x+3}} \quad 5)$$

$$f'(x) = 4x(x+2)(x+1) \quad 6)$$

$$f'(x) = \frac{(4x+9)}{(2x+3)^4} \quad 7)$$

$$f'(x) = 60(5x+2) \quad 8)$$

$$y-5 = \frac{3}{5}(x-3) \quad 9)$$

$$0, -3, -\frac{6}{5} \quad 10)$$

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

$$f'(x) = 4(2x^2 + x - 4)^3(4x + 1)$$

$$f(x) = \sqrt{2x-3}$$

$$f'(x) = (2x-3)^{\frac{1}{2}}$$

$$f'(x) = \frac{1}{2}(2x-3)^{-\frac{1}{2}} \cdot 2$$

$$f(x) = 2\sqrt{x+3}$$

$$f'(x) = 2(x+3)^{-\frac{1}{2}} \cdot \frac{1}{2} = \frac{1}{2} \cdot 2(x+3)^{-\frac{1}{2}}$$

$$f(x) = \frac{x+2}{(2x+3)^3}$$

$$f'(x) = (2x+3)^3(1) - (x+2)[3(2x+3)^2 \cdot 2] \\ (2x+3)^2 [(2x+3) - 6(x+2)] \\ (2x+3)^2 (-4x-9)$$

Find the equation of the tangent line for the function

$$y = \sqrt{x^2 + 16} \text{ at } x = 3 \quad f'(x) = \frac{1}{2}(x^2 + 16)^{-\frac{1}{2}}(2x)$$

$$\frac{1}{2}(x^2 + 16)^{-\frac{1}{2}}(2x) = \frac{x}{\sqrt{x^2 + 16}} \quad \frac{3}{\sqrt{25}} = \frac{3}{5}$$

Find the values of x where the tangent line is horizontal for the function $f(x) = x^2(x+3)^3$

$$x^2(3(x+3)^2) + (x+3)^3(2x) \\ x(x+3)^2 [3x + 2(x+3)]$$

$$2) \quad f(x) = \frac{x}{x+3}$$

$$x(x+3)^{-1} \\ x[-(x+3)^{-2}] + (x+3)^{-1} \cdot 1 \\ (x+3)^{-2} [-x + (x+3)]$$

$$4) \quad f(x) = \frac{4}{(2x-1)^2}$$

$$f'(x) = 4(2x-1)^{-1} \\ = -4(2x-1)^{-2} \cdot 2 \\ = \frac{-8}{(2x-1)^2}$$

$$6) \quad f(x) = x^2(x+2)^2$$

$$x^2[2(x+2)] + (x+2)^2(2x) \\ 2x(x+2)[x + (x+2)] \\ 2x(x+2)(2x+2)$$

$$8) \quad f(x) = 4(5x+2)^3$$

$$f'(x) = 12(5x+2)^2(5) \\ = 60(5x+2)^2$$

$$\frac{x(x+3)^2(5x+6)}{x(x+3)^2(5x+6)}$$

1.4

NO CALCULATORS!!

Given $f(x) = 3x - 4$, $g(x) = x^2 - 4$, $n(x) = \sqrt{x}$, $k(x) = |x|$ $t(x) = x + 2$

Find the following.

$$\underline{3x - x^2} \quad 1) \quad f(x) - g(x) \quad (3x - 4) - (x^2 - 4) = 3x - 4 - x^2 + 4$$

$$\underline{2} \quad 2) \quad k(-2)$$

$$\underline{3x^2 + 2x - 8} \quad 3) \quad t(x) \cdot f(x)$$

$$\underline{x^2 + x - 2} \quad 4) \quad g(x) + t(x)$$

$$\underline{h^{-1}(x) = 3x + 6} \quad 5) \quad \text{Find the inverse for the function } h(x) = \frac{x}{3} - 2$$

$$\underline{h^{-1}(x) = (x - 3)^3} \quad 6) \quad \text{Find the inverse for the function } h(x) = \sqrt[3]{x} + 3$$

$$\underline{3} \quad 7) \quad n(t(7))$$

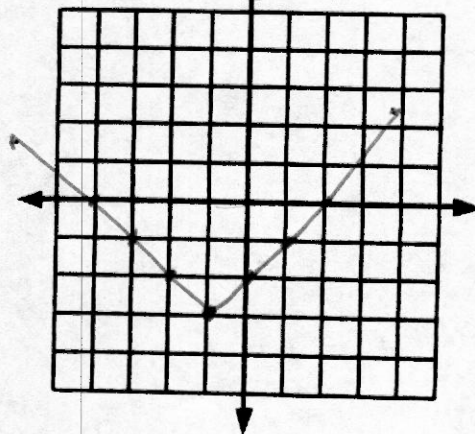
$$\underline{3x^2 - 16} \quad 8) \quad f(g(x))$$

$$\underline{x^2 + 4x} \quad 9) \quad g(t(x))$$

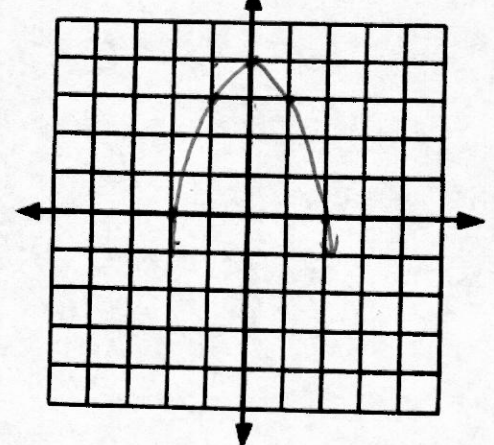
$$\underline{|3x - 4|} \quad 10) \quad k(f(x))$$

Graph the following:

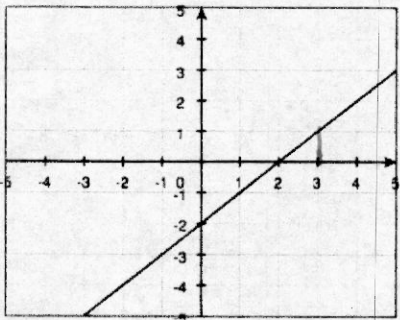
14) $g(x) = |x + 1| - 3$



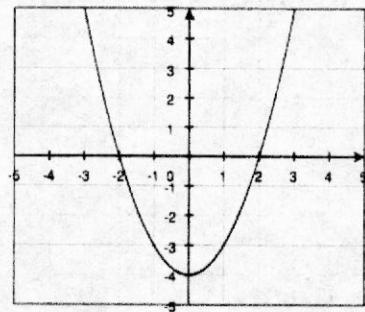
15) $n(x) = -x^2 + 4$



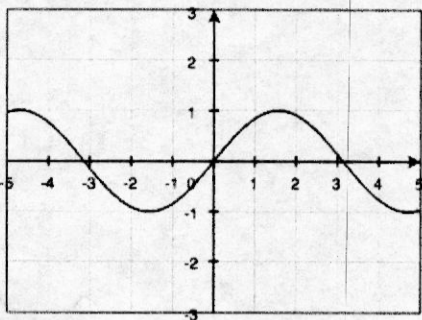
1) $\lim_{x \rightarrow 3^-} f(x) = 1$ $\lim_{x \rightarrow 3^+} f(x) = 1$ $\lim_{x \rightarrow 3} f(x) = 1$



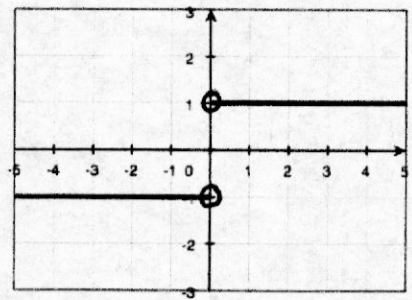
2) $\lim_{x \rightarrow 0^-} f(x) = -4$ $\lim_{x \rightarrow 0^+} f(x) = -4$ $\lim_{x \rightarrow 0} f(x) = -4$



3) $\lim_{x \rightarrow 3^-} f(x) = 0$ $\lim_{x \rightarrow 3^+} f(x) = 0$ $\lim_{x \rightarrow 3} f(x) = 0$



4)



$\lim_{x \rightarrow 0^-} f(x) = -1$ $\lim_{x \rightarrow 0^+} f(x) = 1$ $\lim_{x \rightarrow 0} f(x) = \text{DNE}$

Find the limit. Show work.

6 5)

$\lim_{x \rightarrow -2} (x^2 + 2)$

6) $\lim_{x \rightarrow 0} \sqrt{x+2}$

$\sqrt{2}$ 6)

$\frac{2}{3}$ 7)

$\lim_{x \rightarrow 3} \frac{x+1}{x+3} = \frac{4}{6}$

8) $\lim_{x \rightarrow 1} \frac{x^2-1}{x+1} = \frac{(x-1)(x+1)}{x+1} = x-1$

-2 8)

Intermediate Calculus
Rational Functions

Quiz

Name _____

Complete the following:

1) $f(x) = \frac{x^2 - 1}{x^2 - x - 6} = \frac{(x-1)(x+1)}{(x-3)(x+2)}$

(±1, 0) a)

x-intercepts

(0, 1/6) b)

y-intercepts

x=3, x=-2 c)

VA

y=1 d)

HA

R except 3, -2 e)

Domain

_____ f)

Range

As $x \rightarrow \infty, f(x) \rightarrow 1$

g)

As $x \rightarrow -\infty, f(x) \rightarrow 1$

h) Sign Analysis

i) Graph

