COLLEGE ALGEBRA   EXAM 2 XGR R²   NAME _____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers.

TURN IN ALL WORKSHEETS.   CALCULATORS ARE REQUIRED ON THIS TEST.

1. Given the points (-6, -3) and (2, 3), find:

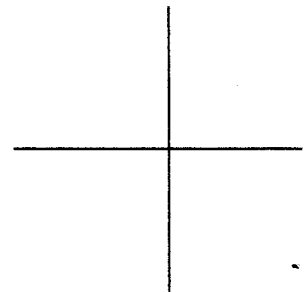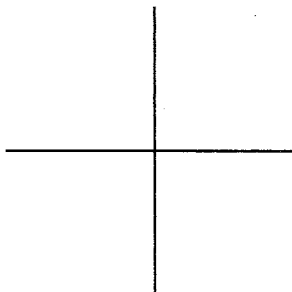   a) slope   b) distance   c) midpoint

2. Find the equation (in slope-
    intercept form) of a line
    between (-6, -3) and (2, 3).
    [Hint: use results of #1.]

3. Find the equation of (in slope-
    intercept form) of the perpen-
    dicular bisector of the line
    segment from (-6,-3) and (2,3).

4. Find the vertex by $-\frac{b}{2a}$ method 5. Find the vertex by $-\frac{b}{2a}$ method.
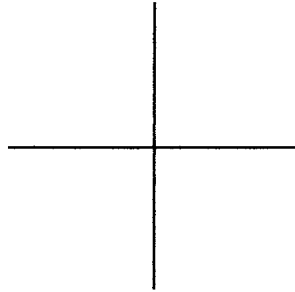   Sketch the graph.   Sketch the graph.

        $y = -3x^2 - 12x + 15$ $x = Y^2 - 6Y - 7$

6. Find the center and radius by completing the square. Sketch the graph.

$$x^2 + y^2 - 14x + 10y + 65 = 0$$

7. Find the equation of the circle whose center is (-3, 5), and passing thru (0,0).

8. Let $f(x) = \dfrac{5 - 3x}{x - 3}$

a) $f(3) =$

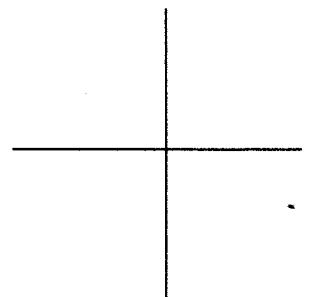b) $f(-3) =$

c) $f(5x-7) =$

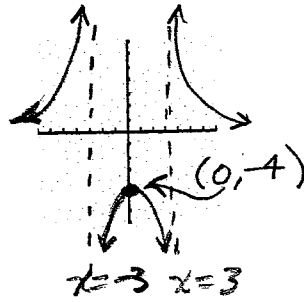9. Let $f(x) = \dfrac{2x + 5}{2x}$ and $g(x) = x^2 - 2x$

a) find $f[g(x)]$ b) find $g[f(x)]$

10. Find the domain (give interval notation when appropriate) [Hint: in d) sketch the graph with graphing calculator!]

a) $y = x^2 - 9$ b) $y = \dfrac{x + 4}{x^2 - 9}$ c) $y = \dfrac{x - 6}{\sqrt{6 - 2x}}$ d) $y = \sqrt{x^2 - 9}$

11.   Given the graph:

(0,-4)

x = -3   x = 3

a) Domain:

b) Range:

c) Function?

12. Given the equation:

$$xy = 6x - 4$$

a) Domain:

b) Range:

c) Function?

13.   Let $f(X) = 2X - 3$ and $g(X) = X^2 - 4X + 3$

   $f(5) =$ _____ $g(5) =$ _____

   a) $(f + g)(5) =$ b) $(f - g)(5) =$

   c) $(fg)(5) =$ d) $(f/g)(5) =$

   e) $(f \circ g)(5) =$ f) $(g \circ f)(5) =$

14.   Given $f(x) = \dfrac{3x - 5}{3x}$,   find $f^{-1}(X)$.

COLLEGE ALGEBRA   EXAM 2 XG Solutions.   NOTE: In #2, you may use any point.
                                         In #3, you must use MIDPOINT!

1. $(-6,-3)$ $(2,3)$

(7) **2.** $m=\frac{3}{4}$ $(2,3)$ **3.** $m_\perp=-\frac{4}{3}$ Midot

a) $m=\frac{3-(-3)}{2-(-6)}$ b) $d=\sqrt{8^2+6^2}$ c) midot

$=\frac{6}{8}=\frac{3}{4}$ $=\boxed{10}$ $\left(\frac{-6+2}{2},\frac{-3+3}{2}\right)$ $\boxed{(-2,0)}$

$y=mx+b$ $(-2,0)$

$3=\frac{3}{4}\cdot2+b$ $y=mx+b.$

$12=6+4b.$ $0=-\frac{4}{3}(-2)+b.$

$b=\frac{3}{2}$ $0=\frac{8}{3}+b, b=-\frac{8}{3}$

$\boxed{y=\frac{3}{4}x+\frac{3}{2}}$ $\boxed{y=-\frac{4}{3}x-\frac{8}{3}}$

4. $y=-3x^2-12x+15$

vertex $x=-\frac{6}{2a}=\frac{12}{6}=-2$

$y=-3(-2)^2-12(-2)+15$

$y=27$ $\boxed{V(-2,27)}$

Parabola Opens down.

$(-2,27)$
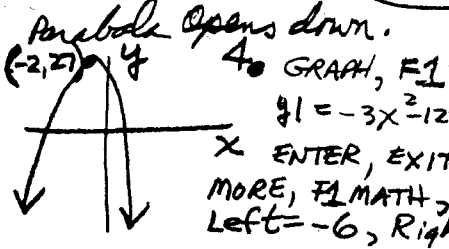
4. GRAPH, F1
$y1=-3x^2-12x+15$
ENTER, EXIT GRAPH
MORE, F1 MATH, FMAX
Left=-6, Right=6, ENTER $\boxed{(-2,27)}$

5. $x=y^2-6y-7$

vertex $y=-\frac{6}{2a}=\frac{6}{2}=3$

$x=3^2-6(3)-7$

$x=-16$ $\boxed{V(-16,3)}$
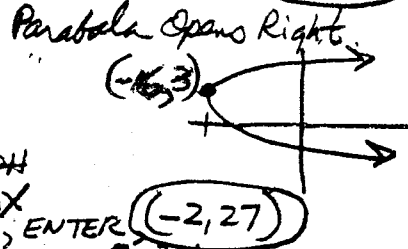
Parabola Opens Right.

6. $x^2-14x+\_\_+y^2+10y+\_\_=-65$

$x^2-14x+49+y^2+10y+25=-65$
$+49$
$+25$

$(x-7)^2+(y+5)^2=9$

$\boxed{C(7,-5)}$ $r^2=9$ $\boxed{r=3}$
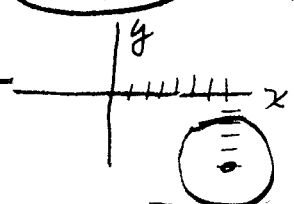
7. $C(-3,5)$ $(0,0)$

1) radius $=\sqrt{3^2+5^2}$

$=\sqrt{9+25}=\sqrt{34}$

$(x-h)^2+(y-k)^2=r^2$

$\boxed{(x+3)^2+(y-5)^2=34}$

8. $f(x)=\frac{5-3x}{x-3}$

(9) a) $f(3)=\frac{5-9}{0}=\boxed{Undef}$

b) $f(-3)=\frac{5+9}{-3-3}=\boxed{-\frac{7}{3}}$

c) $f(5x-7)=\frac{5-3(5x-7)}{(5x-7)-3}$

$=\frac{5-15x+21}{5x-10}=\boxed{\frac{26-15x}{5(x-2)}}$
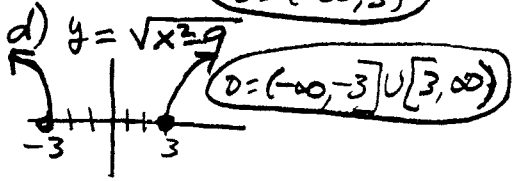
9. $f(x)=\frac{2x+5}{2x}$ $g(x)=x^2-2x$

(8) a) $f[g(x)]=\frac{2(x^2-2x)+5}{2(x^2-2x)}$

$=\boxed{\frac{2x^2-4x+5}{2x(x-2)}}$

b) $g[f(x)]=\left(\frac{2x+5}{2x}\right)^2-2\left(\frac{2x+5}{2x}\right)$

$=\frac{4x^2+20x+25}{4x^2}-\frac{2x\cdot2(2x+5)}{2x\cdot2x}$

$=\frac{4x^2+20x+25-4x(2x+5)}{4x^2}$

$=\frac{4x^2+20x+25-8x^2-20x}{4x^2}$

$=\boxed{\frac{-4x^2+25}{4x^2}}$

10 a) $y=x^2-9$ $\boxed{D:(-\infty,\infty)}$

b) $y=\frac{x+4}{x^2-9}$ $\boxed{D: all\ x\neq\pm3}$

c) $y=\frac{x-6}{\sqrt{6-2x}}$ $6-2x>0$
$-2x>-6$
$x<3$
$\boxed{D:(-\infty,3)}$

d) $y=\sqrt{x^2-9}$

$\boxed{D:(-\infty,-3]\cup[3,\infty)}$

11. $f(x)=\begin{cases}-x^2+3 & if\ x<-2\\ 6 & if\ -2\leq x<0\\ -3-2x & if\ x\geq3\end{cases}$

a) $f(2)=\boxed{6}$

b) $f(3)=-3-2(3)=\boxed{-9}$

c) $f(-5)=-5^2+3=\boxed{-22}$

d) $f(0)=\boxed{6}$

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

(8) $f(5)=7$ $g(5)=25-20+3=8$

a) $(f+g)(5)=f(5)+g(5)$
$=7+8=\boxed{15}$

b) $(f-g)(5)=7-8=\boxed{-1}$

c) $(f\cdot g)(5)=7\cdot8=\boxed{56}$

d) $(f/g)(5)=\boxed{7/8}$

e) $(f\circ g)(5)$
$=f[g(5)]$
$=f(8)$
$=2(8)-3$
$=\boxed{13}$

f) $(g\circ f)(5)$
$=g[f(5)]$
$=g(7)$
$=7^2-4(7)+3$
$=49-28+3=\boxed{24}$

13. $f(x)=\frac{3x-5}{3x}$

(7) $y=f(x)$ $y=\frac{3x-5}{3x}$

$y=f^{-1}(x)$ $x=\frac{3y-5}{3y}$

$3xy=3y-5$

$3xy-3y=-5$ $f^{-1}(x)$

$y(3x-3)=-5$

$\boxed{y=\frac{-5}{3x-3}}$ or $\frac{5}{3-3x}$