COLLEGE ALGEBRA   EXAM 2 PG   R^2   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 (4, –3) and (–2, –7), find: (2 points each)

   a) slope   b) midpoint   c) distance

In 2 – 3, find the equation in y = mx + b form   (5 points each)

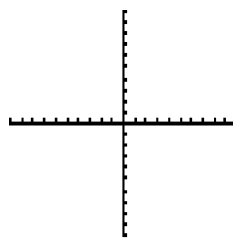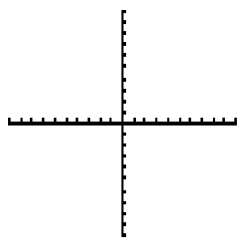2. of a line between (4, –3) and (–2, –7).   3. Find the equation of the perpendicular
                                                               bisector of the line segment between
                                                               (4, –3) and (–2, –7).

In 4 – 5, sketch the graphs. Find the vertex.   (4 points each)
4. $y = (x+4)^2 - 2$ 5. $x = (y+4)^2 - 2$
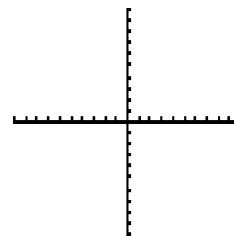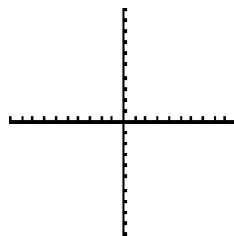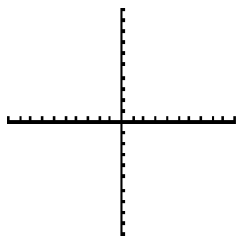
In 6 – 8, find the vertex (show work or explain how you did it!), and sketch the graph. (4 each)

6. $y = x^2 - 6x + 5$ 7. $y = -2x^2 + 12x + 5$ 8. $x = -y^2 + 8y - 4$
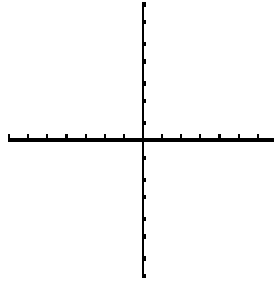
In 9 – 10: (5 points each)

9. Find the center and radius by completing the square. Sketch.
$$x^2 + y^2 - 10x + 4y + 20 = 0$$

10. Find the equation of a circle whose center is at (–4, 6) and passing through (5, 3).

11. Find the domain (give interval notation when appropriate). (2 points each part)
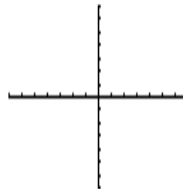
a) $y = \dfrac{x^2 - 9}{x^2 - 5x - 36}$ b) $y = \dfrac{x^2 - 4}{\sqrt{5 - x}}$ c) $y = \sqrt{4 + 5x}$ d) $xy + 6y = 4$
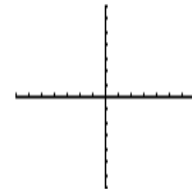
12. Given the equation $y = \sqrt{25 - x^2}$

13. Given the equation: $y = -\sqrt{x^2 - 36}$

(2 points each part)
  a) Domain:

  b) Range:

  c) Function?

(2 points each part)
  a) Domain:

  b) Range:

  c) Function?

14. Let $f(x) = \dfrac{4-3x}{2x}$

   (2 points each part)
   a) f(0) =

   b) f(4) =

   c) f(2x-7) =

15. Let $f(x) = \dfrac{x-4}{2x}$ and $g(x) = x^2 - 4$

   (4 points each part)
   a) find f[g(x)] and simplify.

   b) find g[f(x)] and simplify.

16. Let $f(x) = x^2 - 4x$ and $g(x) = 2x - 4$

   (1 point each part)
   a) (f + g)(−1) =   b) (f - g)(−1) =

   c) (f•g)(−1) =   d) (f/g)(−1) =

   e) (f ∘ g)(−1) =   f) (g ∘ f)(−1) =

17. $f(x) = \begin{cases} x^2 - 6 & \text{if } x \le -3 \\ 7 & \text{if } -3 < x < 4 \\ -3x + 4 & \text{if } x \ge 4 \end{cases}$

   a) f(5)   b) f(-5)

   c) f(0)   d) f(-3)

   e) f(4)   f) f(3.999)

In 18 - 19, 4 points each

18. $f(x) = 3x - 4$ and $f^{-1}(x) = \dfrac{1}{3}x + \dfrac{4}{3}$

   Show by finding $f[f^{-1}(x)] = x$ that
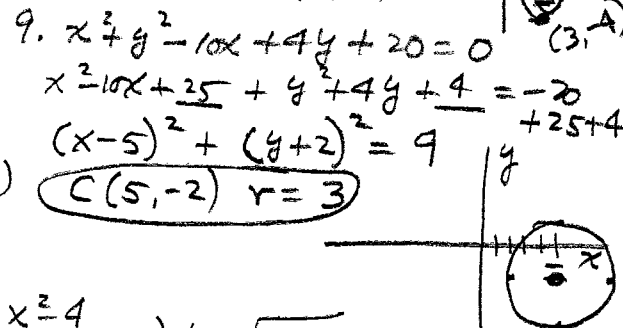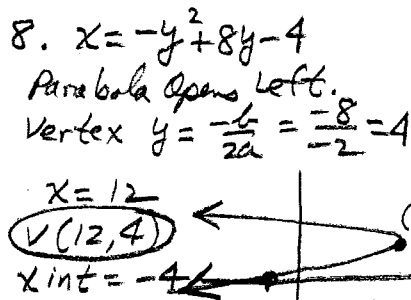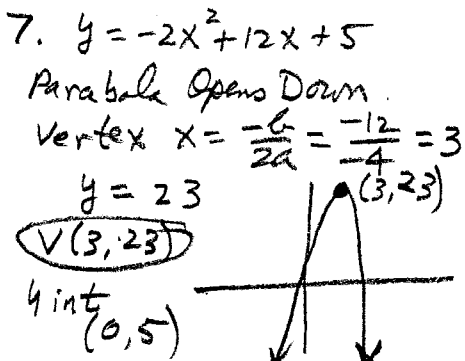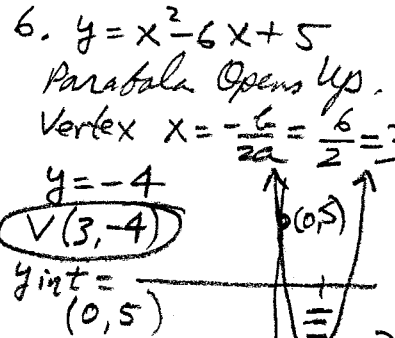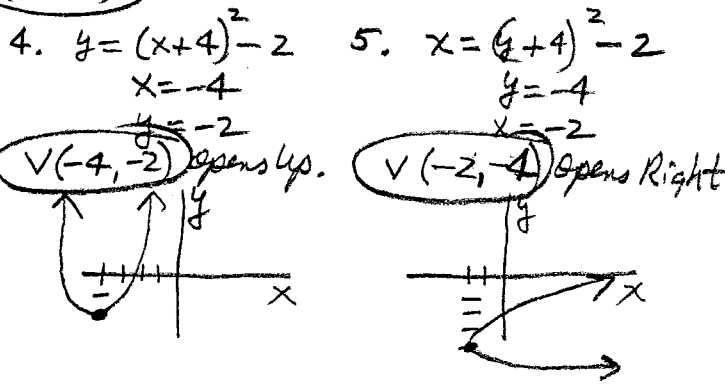 $f(x)$ and $f^{-1}(x)$ are inverse functions.

19. Given $f(x) = \dfrac{2x}{4x+3}$, find f^{-1}(x).

COLLEGE ALGEBRA   EXAM 2 PG Solutions

1. $(4,-3)$ $(-2,-7)$ $m=\frac{y_2-y_1}{x_2-x_1}$, $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

  a) $m=\frac{-7-(-3)}{-2-4}$
    $=\frac{-4}{-6}=\boxed{\frac{2}{3}}$

  b) midpt
   $\left(\frac{4+(-2)}{2}, \frac{-3+-7}{2}\right)$
   $\boxed{(1,-5)}$

  c) $d=\sqrt{6^2+4^2}$
   $=\sqrt{36+16}=\sqrt{52}=\boxed{2\sqrt{13}}$

2. $y=mx+b$
  $-3=\frac{2}{3}(4)+b$
  $-9=8+3b$
  $-17=3b$
  $b=\frac{-17}{3}$
  $\boxed{y=\frac{2}{3}x-\frac{17}{3}}$

3. midpt $=(1,-5)$
  $m=\frac{2}{3}$, $m_\perp=-\frac{3}{2}$
  $y=mx+b$
  $-5=-\frac{3}{2}(1)+b$
  $-10=-3+2b$
  $-7=2b$
  $b=-7/2$ $\boxed{y=-\frac{3}{2}x-\frac{7}{2}}$

4. $y=(x+4)^2-2$
  $x=-4$
  $y=-2$
  $\boxed{V(-4,-2)}$ Opens Up.

5. $x=(y+4)^2-2$
  $y=-4$
  $x=-2$
  $\boxed{V(-2,-4)}$ Opens Right

6. $y=x^2-6x+5$
  Parabola Opens Up.
  Vertex $x=-\frac{b}{2a}=\frac{6}{2}=3$
  $y=-4$
  $\boxed{V(3,-4)}$
  y int $=(0,5)$ $(0,5)$ $(3,-4)$

7. $y=-2x^2+12x+5$
  Parabola Opens Down.
  Vertex $x=-\frac{b}{2a}=\frac{-12}{-4}=3$
  $y=23$ $(3,23)$
  $\boxed{V(3,23)}$
  y int $(0,5)$

8. $x=-y^2+8y-4$
  Parabola Opens Left.
  Vertex $y=-\frac{b}{2a}=\frac{-8}{-2}=4$
  $x=12$
  $\boxed{V(12,4)}$ $(12,4)$
  x int $=-4$

9. $x^2+y^2-10x+4y+20=0$
  $x^2-10x+25+y^2+4y+4=-20+25+4$
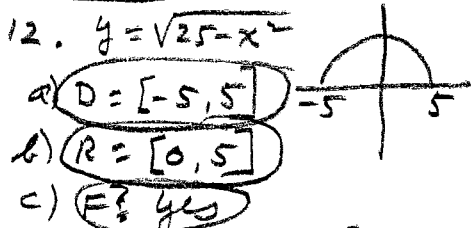 $(x-5)^2+(y+2)^2=9$
  $\boxed{C(5,-2)\ r=3}$

10. radius $=$ distance
  $r=\sqrt{9^2+3^2}=\sqrt{90}$
  $C(-4,6)$ $r^2=90$
  $\boxed{(x+4)^2+(y-6)^2=90}$

11 a) $y=\frac{x^2-9}{x^2-5x-36}$
  $\frac{(x-9)(x+4)}{}$
  $\boxed{D:\text{ all } x\neq 9,-4}$

b) $y=\frac{x^2-4}{\sqrt{5-x}}$
  $5-x>0$
  $-x>-5$
  $x<5$
  $\boxed{(-\infty,5)}$

c) $y=\sqrt{4+5x}$
  $4+5x\geq0$
  $5x\geq-4$
  $x\geq-4/5$
  $\boxed{[-4/5,\infty)}$

d) $xy+6y=4$
  Solve for y:
  $y(x+6)=4$
  $y=\frac{4}{x+6}$
  $\boxed{D:\text{ all } x\neq-6}$

12. $y=\sqrt{25-x^2}$
  a) $\boxed{D:[-5,5]}$
  b) $\boxed{R:[0,5]}$
  c) $\boxed{F?\ \text{yes}}$

13. $y=-\sqrt{x^2-36}$
  a) $\boxed{D:(-\infty,-6]\cup[6,\infty)}$
  b) $\boxed{R:(-\infty,0]}$
  c) $\boxed{F?\ \text{yes}}$

14. $f(x)=\frac{4-3x}{2x}$
  a) $f(0)=\boxed{\text{Undef}}$
  b) $f(4)=\frac{4-12}{8}=\boxed{-1}$
  c) $f(2x-7)=\frac{4-3(2x-7)}{2(2x-7)}$
   $=\frac{4-6x+21}{2(2x-7)}=\boxed{\frac{25-6x}{2(2x-7)}}$

15a) $f(x)=\frac{x-4}{2x}$
  $g(x)=x^2-4$
  $f[g(x)]=\frac{x^2-4-4}{2(x^2-4)}=\boxed{\frac{x^2-8}{2(x^2-4)}}$

15b) $g[f(x)]=\left(\frac{x-4}{2x}\right)^2-4$
  $=\frac{x^2-8x+16}{4x^2}-\frac{4\cdot4x^2}{1\cdot4x^2}$
  $=\boxed{\frac{-15x^2-8x+16}{4x^2}}$

16. $f(x)=x^2-4x$ $g(x)=2x-4$
  $f(-1)=5$ $g(-1)=-6$
  a) $5+-6=\boxed{-1}$
  b) $5-(-6)=\boxed{11}$
  c) $5\cdot(-6)=\boxed{-30}$
  d) $\boxed{\frac{5}{-6}}$

e) $(f\circ g)(-1)$ f) $(g\circ f)(-1)$
  $f[g(-1)]$ $g[f(-1)]$
  $f[-6]$ $g[5]$
  $(-6)^2-4(-6)$ $2(5)-4$
  $36+24$ $\boxed{6}$
  $\boxed{60}$

17 a) $-3(5)+4=\boxed{-11}$
  b) $(-5)^2-6=\boxed{19}$
  c) $f(0)=\boxed{7}$
  d) $(-3)^2-6=\boxed{3}$
  e) $-3(4)+4=-8$
  f) $f(3.999)=\boxed{7}$

18. $f[f^{-1}(x)]$
  $=3\left(\frac{1}{3}x+\frac{4}{3}\right)-4$
  $=x+4-4=\boxed{x}$

19. $y=\frac{2x}{4x+3}$ $y=f(x)$
  $x=\frac{2y}{4y+3}$ $y=f^{-1}(x)$
  $4xy+3x=2y$
  $4xy-2y=-3x$

19. Continued
  $y(4x-2)=-3x$
  $\boxed{y=\frac{-3x}{4x-2}=f^{-1}(x)}$
  #19. continued