

East Los Angeles College
Department of Mathematics
Math 125
Test 4

Let $f(x) = x^2 - 6x + 3$

Determine:

- | | |
|------------------|---------------------|
| 1) Vertex | 2) Axis of Symmetry |
| 3) Opens up/down | 4) x-intercepts |
| 5) y-intercepts | 6) Sketch the curve |
-

Graph the following conic sections.

- | | |
|---|--|
| 7) $x^2 - 6x + y^2 = 16$ | 8) $x^2 + y^2 + 4y = 12$ |
| 9) $\frac{(x-1)^2}{25} + \frac{(y+3)^2}{9} = 1$ | 10) $\frac{(x-1)^2}{25} - \frac{(y+3)^2}{9} = 1$ |
-

Solve the following Radical Equations.

- | | |
|--------------------------------|---------------------------|
| 11) $\sqrt{x-4} = 2$ | 12) $3\sqrt{x} - 5 = 7$ |
| 13) $\sqrt{x-3} = \sqrt{2x-5}$ | 14) $x = \sqrt{x+13} + 7$ |
-

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

Determine:

- | | |
|----------------|---------------------|
| 15) $f(-3)$ | 16) $f(0)$ |
| 17) $f(1)$ | 18) $f(t)$ |
| 19) $f(t - 1)$ | 20) The domain of f |
-

Let $g(x) = \sqrt{4x + 8}$

Determine:

- 26) The domain of g

Let $h(x) = \frac{4}{2x+6}$

Determine:

27) The domain of h

Let $f(x) = x^2 - 2x + 4$ and $g(x) = \sqrt{4x + 8}$

28) $(f \circ g)(x)$

29) $(g \circ f)(x)$

Determine the inverse functions for the following 1 to 1 functions.

30) $f(x) = 4x + 1$

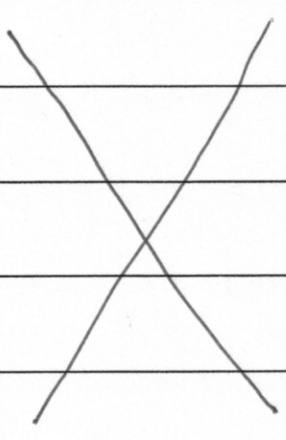
31) $f(x) = \sqrt{x + 3}$

32) $f(x) = x^3 - 4$

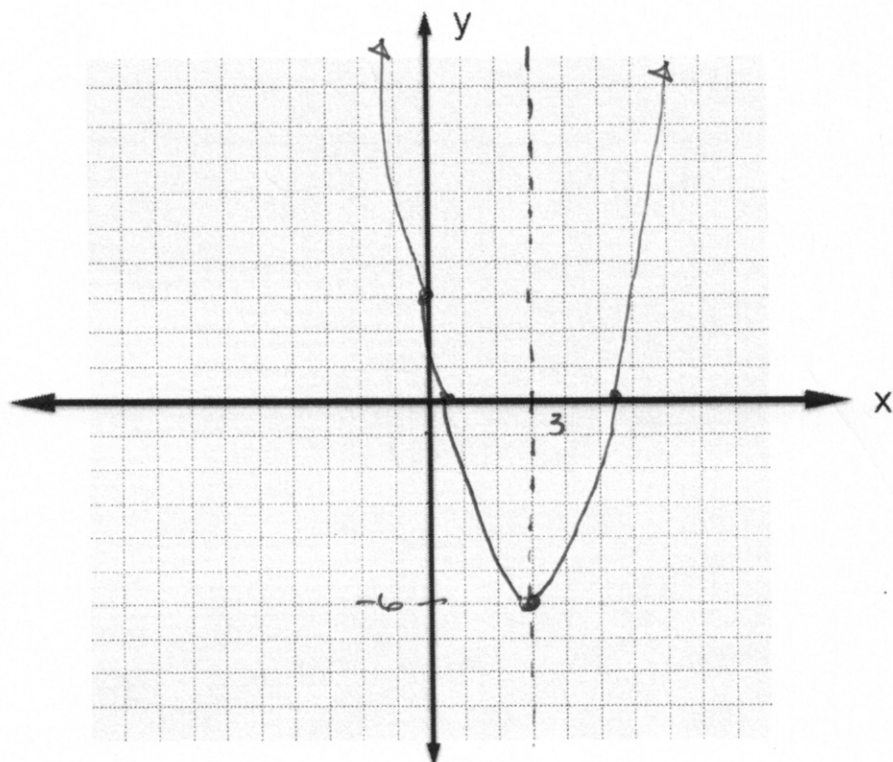
33) $f(x) = x^2 + 5$ for $x \geq 0$

34) What is your name?

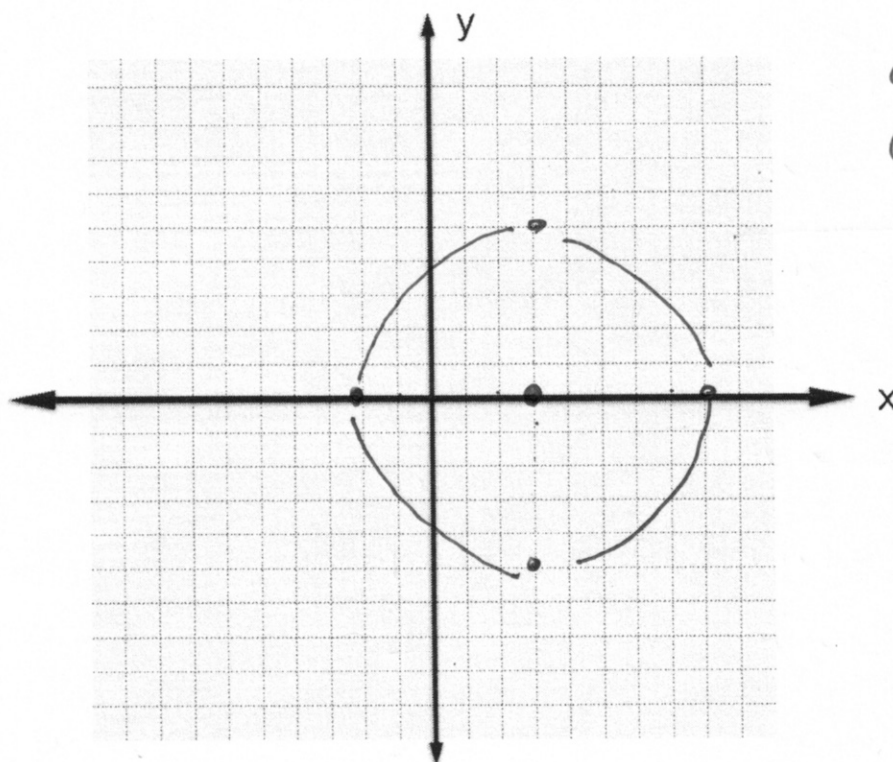
Answer Sheet

1	$(3, -6)$	18	$t^2 - 2t + 4$
2	$x = 3$	19	$t^2 - 4t + 7$
3	UP	20	$\mathbb{R}$
4	$(3+\sqrt{6}, 0), (3-\sqrt{6}, 0)$	21	
5	$(0, 3)$	22	
6	Use Graph Paper	23	
7	Use Graph Paper	24	
8	Use Graph Paper	25	
9	Use Graph Paper	26	$\{x \mid x \geq -2\}$
10	Use Graph Paper	27	$\{x \mid x \neq -3\}$
11	$\{8\}$	28	$4x - 2\sqrt{4x+8} + 12$
12	$\{16\}$	29	$\sqrt{4x^2 - 8x + 24}$
13	$\{5\}$	30	$f'(x) = \frac{x-1}{4}$
14	$\{12\}$	31	$f'(x) = x^2 - 3$
15	19	32	$f'(x) = \sqrt[3]{x+4}$
16	4	33	$f'(x) = \sqrt{x-5}$
17	3	34	Solutions

6)



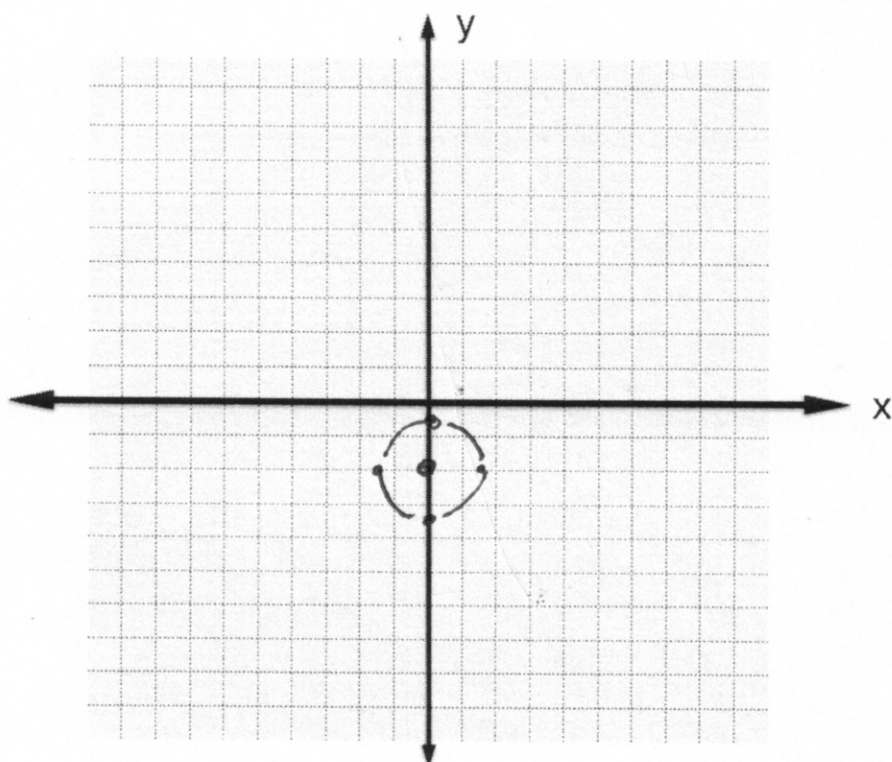
7)



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

$$C(3,0) ; r=5$$

8)

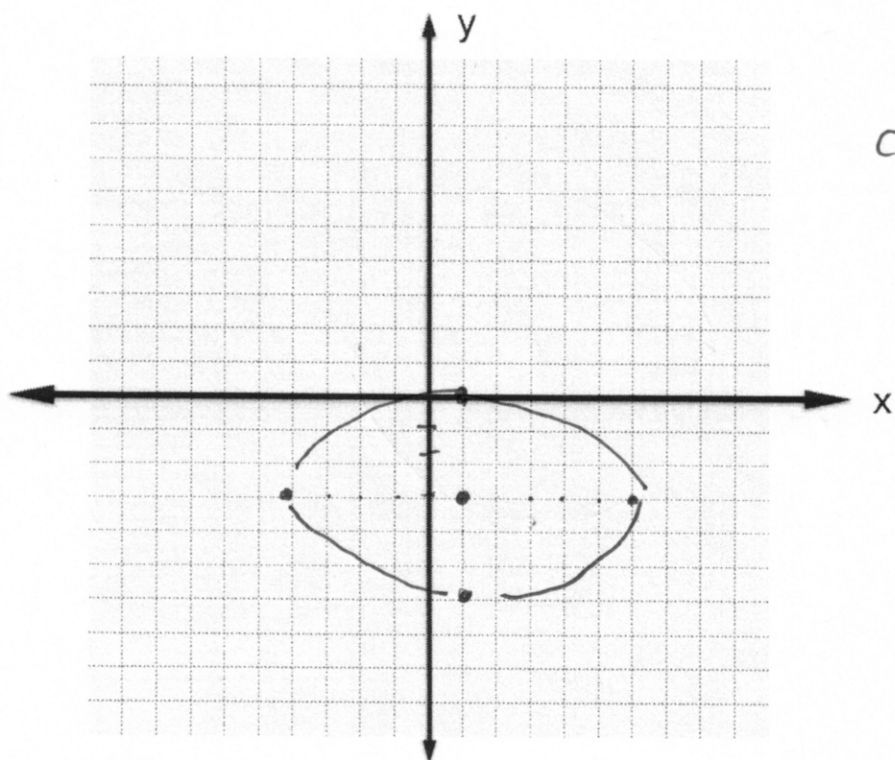


$$x^2 + (y+2)^2 = 2$$

$$C(0, -2)$$

$$r = \sqrt{2}$$

9)



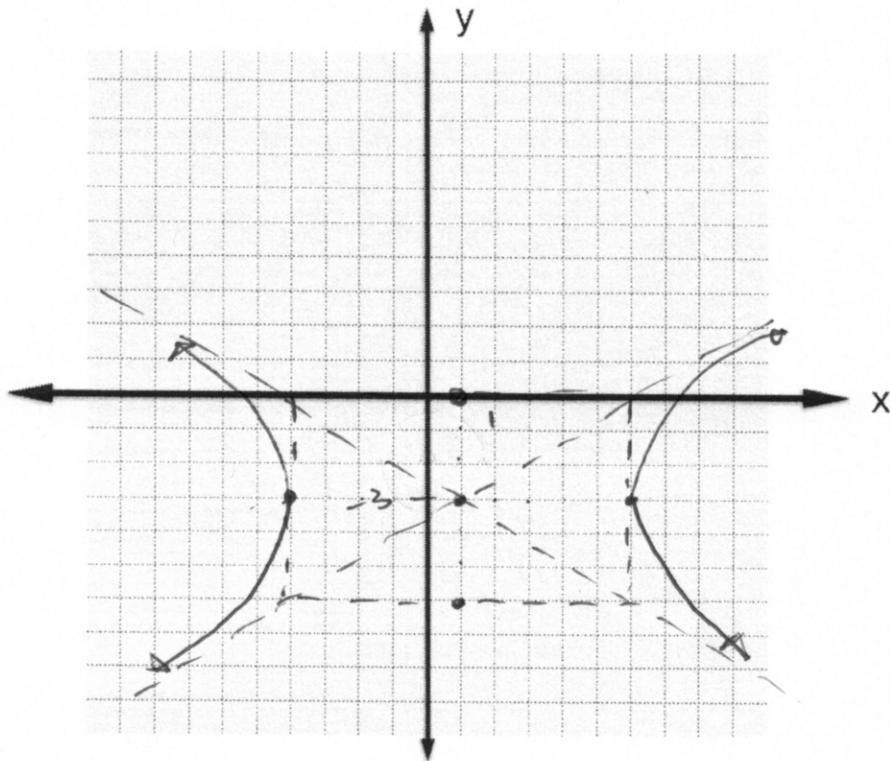
ellipse

$$C(1, -3)$$

$$a = \pm 5$$

$$b = \pm 3$$

10)



Horizontal
Hyperbola

$C(1, -3)$

$a = \pm 2$

$b = \pm 3$

$$y = x^2 - 6x + 3$$

complete the square

$$y = x^2 - 6x + 9 - 9 + 3$$

$$\left| \begin{array}{c} \text{factor} \quad \text{add} \\ y = (x-3)^2 - 6 \end{array} \right|$$

$$(1) \quad -\frac{b}{2} = (-3)$$

$$(2) \quad (-3)^2 = 9$$

$$(1) \quad \text{Vertex } \left| (3, -6) \right|$$

$$(5) \quad \text{y-int}$$

$$(2) \quad \left| x = 3 \right|$$

$$y = (0-3)^2 - 6$$

$$(3) \quad \text{opens } \left| \text{up} \right|$$

$$y = (-3)^2 - 6$$

$$(4) \quad \text{x-int}$$

$$y = 9 - 6 \quad \left| y = 3 \right|$$

$$0 = (x-3)^2 - 6$$

$$(x-3)^2 - 6 = 0$$

$$+6 \quad +6$$

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

$$x-3 = \pm \sqrt{6}$$

$$+3 \quad -3$$

$$\left| x = 3 \pm \sqrt{6} \right|$$

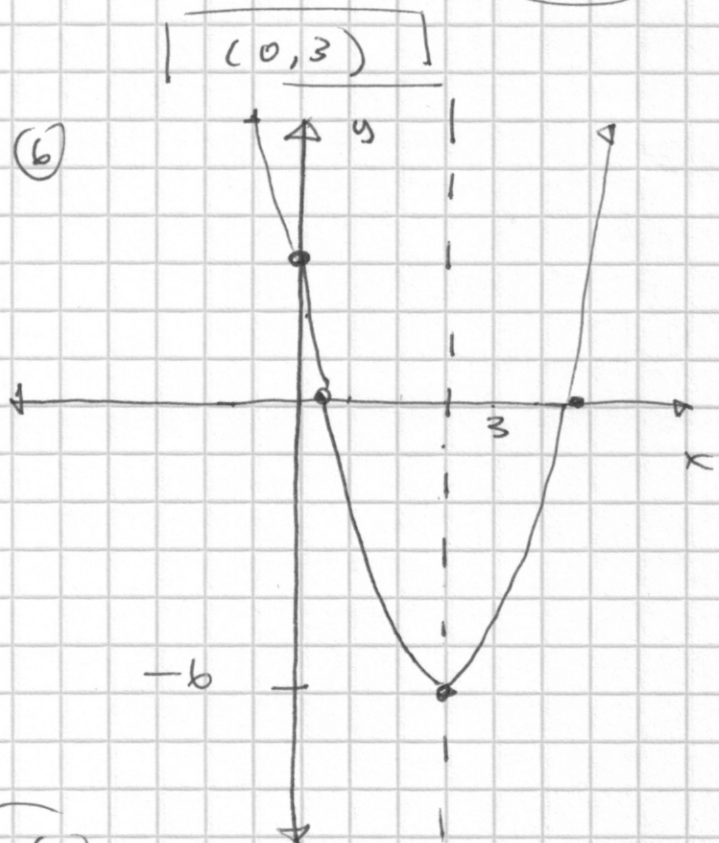
$$(3 + \sqrt{6}, 0)$$

$$(5.5, 0)$$

$$(3 - \sqrt{6}, 0)$$

$$(0.5, 0)$$

$$\sqrt{6} \approx 2.5$$



$$(7) \quad x^2 - 6x + y^2 = 16$$

$$\frac{-b}{2} = (-3)$$

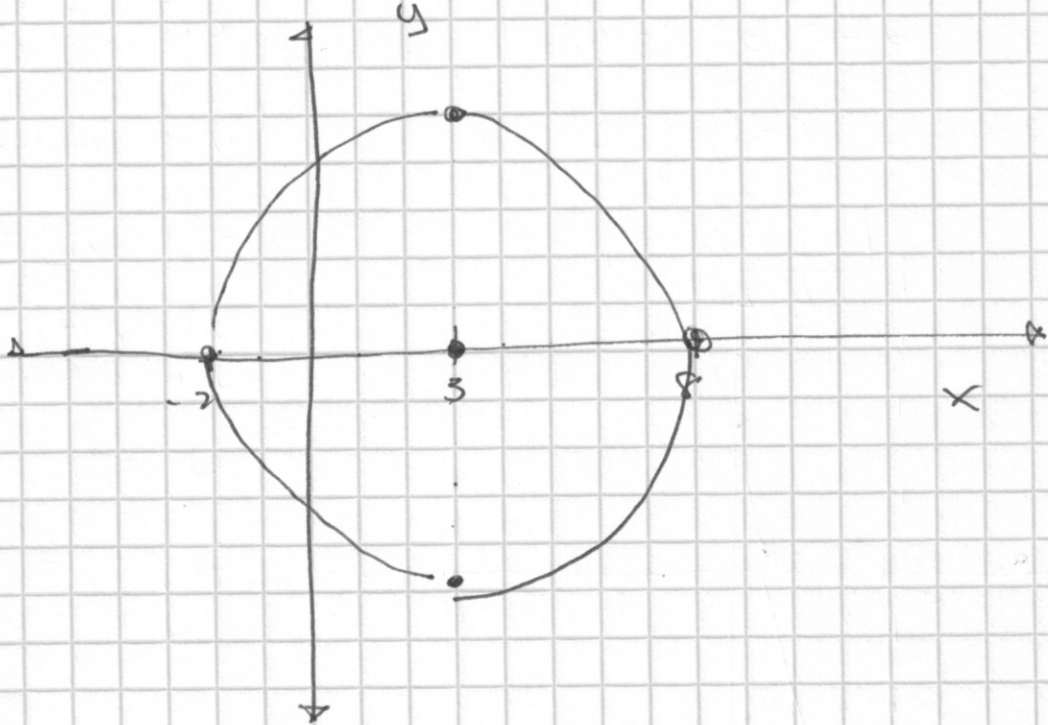
$$(-3)^2 = 9$$

$$x^2 - 6x + 9 - 9 + y^2 = 16$$

$$(x-3)^2 - 9 + y^2 = 16$$

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

circle ; (3,0) ; r=5



$$(8) \quad x^2 + y^2 + \frac{dy}{dx} = 12$$

$$(1) \quad \frac{4}{2} = (2) \quad (2) \quad 2^2 = \boxed{4}$$

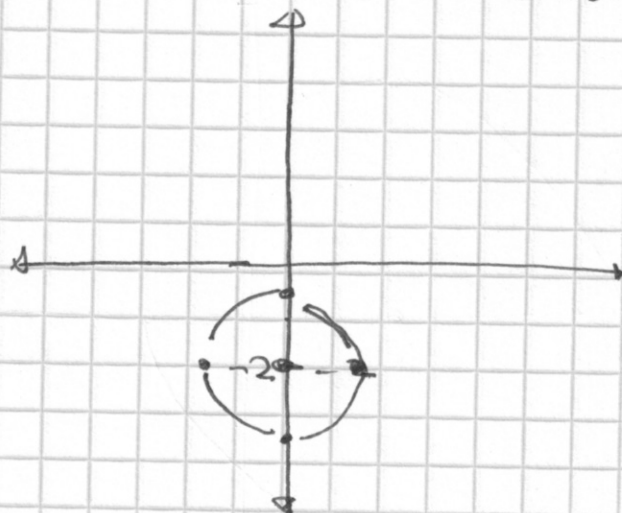
$$x^2 + \underbrace{y^2 + 4y + 4}_{\text{factor}} - \underbrace{4 + 2}_{\text{add}} = 0$$

$$x^2 + (y+2)^2 - 2 = 0$$

+2 +2

$$\textcircled{B} \quad x^2 + (y+2)^2 = 2$$

circle (0, -2) ; $r = \sqrt{2} \approx 1.41$



$$(9) \quad \frac{(x-1)^2}{25} + \frac{(y+3)^2}{9} = 1$$

ellipse

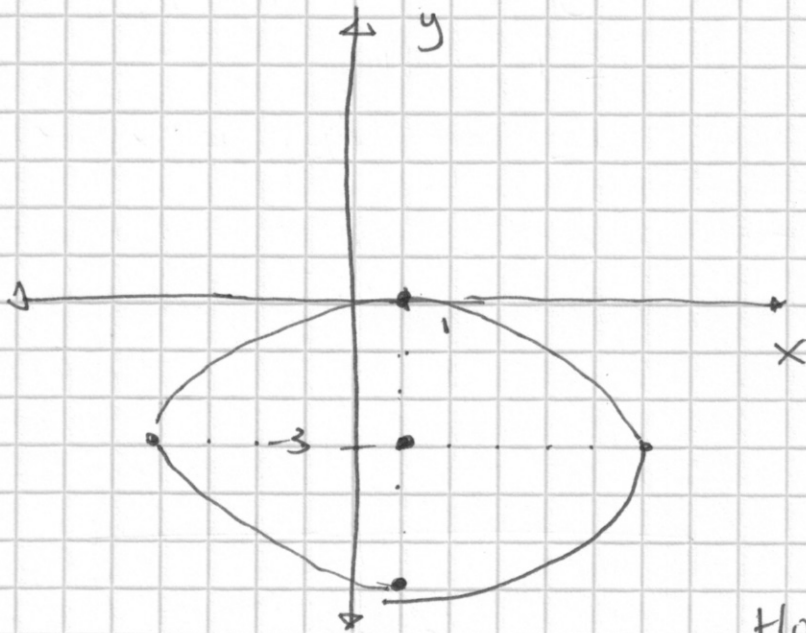
C (1, -3)

$$a^2 = 25$$

$$b^2 = 9$$

$$a = \pm 5$$

$$b = \pm 3$$



Horizontal

$$(10) \quad \frac{(x-1)^2}{25} - \frac{(y+3)^2}{9} = 1$$

Hyperbola

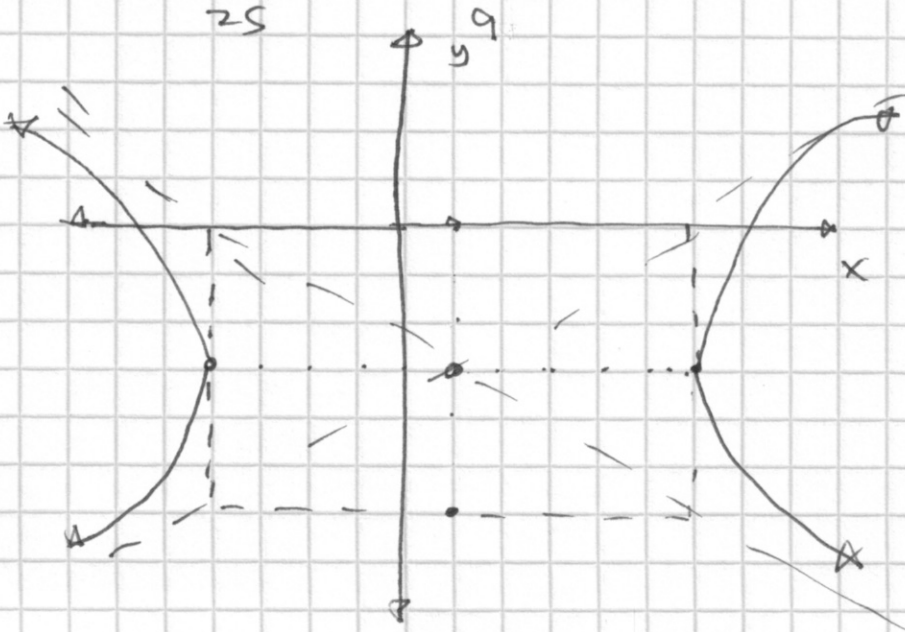
C (1, -3)

$$a^2 = 25$$

$$a = \pm 5$$

$$b^2 = 9$$

$$b = \pm 3$$



$$(11) (\sqrt{x-4})^2 = 2^2$$

$$\begin{array}{r} x-4 = 4 \\ +4 \quad +4 \end{array}$$

$$\boxed{x=8}$$

~~$$\begin{array}{r} (14) \\ x = \sqrt{x+13} \\ -17 \quad +17 \\ -17 \end{array}$$~~

~~$$\begin{array}{r} x-17 = \sqrt{x+13} \\ (x-17)^2 = (\sqrt{x+13})^2 \end{array}$$~~

$$(12) \begin{array}{r} 3\sqrt{x} - 5 = 7 \\ +5 \quad +5 \end{array}$$

$$\frac{3\sqrt{x}}{3} = \frac{12}{3}$$

$$\sqrt{x} = 4$$

$$(\sqrt{x})^2 = 4^2$$

$$\boxed{x=16}$$

~~$$(x-17)^2 = x+13$$~~

~~$$(x-17)(x-17) = x+13$$~~

~~$$\begin{array}{r} x^2 - 34x + 289 = x+13 \\ -x \quad -x \end{array}$$~~

~~$$\begin{array}{r} x^2 - 35x + 289 = 13 \\ -13 \quad -13 \end{array}$$~~

$$(13) (\sqrt{x-3})^2 = (\sqrt{2x-5})^2$$

$$\begin{array}{r} x-3 = 2x-5 \\ -2x \quad -2x \end{array}$$

$$\begin{array}{r} -x-3 = -5 \\ +3 \quad +3 \end{array}$$

$$\frac{-x}{-1} = \frac{-5}{-1}$$

$$\boxed{x=5}$$

~~$$x^2 - 35x + 276 = 0$$~~

~~$$(x$$~~

14

$$\begin{array}{rcl} x & = & \sqrt{x+13} \\ -7 & & +7 \\ & & -7 \end{array}$$

$$x-7 = \sqrt{x+13}$$

$$(x-7)^2 = (\sqrt{x+13})^2$$

$$(x-7)^2 = x+13$$

$$(x-7)(x-7) = x+13$$

$$\begin{array}{rcl} x^2 - 14x + 49 & = & x+13 \\ -x & & -x \end{array}$$

$$\begin{array}{rcl} x^2 - 15x + 49 & = & 13 \\ -13 & & -13 \end{array}$$

$$x^2 - 15x + 36 = 0$$

$$(x-12)(x-3) = 0$$

$$\begin{array}{rcl} x-12 & = & 0 \\ +12 & +12 & \end{array}$$

$$x=12$$

$$\begin{array}{rcl} x-3 & = & 0 \\ +3 & +3 & \end{array}$$

$$x=3$$

$$\boxed{\{12, 3\}}$$

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

$$\begin{aligned} (15) \quad f(-3) &= (-3)^2 - 2(-3) + 4 \\ &= 9 + 6 + 4 \\ &= \underline{19} \end{aligned}$$

$$\begin{aligned} (16) \quad f(0) &= 0^2 - 2 \cdot 0 + 4 \\ &= 0 - 0 + 4 \\ &= \underline{4} \end{aligned}$$

$$\begin{aligned} (17) \quad f(1) &= 1^2 - 2 \cdot 1 + 4 \\ &= 1 - 2 + 4 \\ &= -1 + 4 \\ &= \underline{3} \end{aligned}$$

$$(18) \quad f(t) = \underline{t^2 - 2t + 4}$$

$$\begin{aligned} (19) \quad f(t-1) &= (t-1)^2 - 2(t-1) + 4 \\ &= (t-1)(t-1) - 2t + 2 + 4 \\ &= t^2 - 2t + 1 - 2t + 2 + 4 \\ &= \underline{t^2 - 4t + 7} \end{aligned}$$

$$(20) \quad \underline{\mathbb{R}}$$

$$f(x) = \sqrt{4x+8}$$

$$(26) \quad \begin{array}{r} 4x + 8 \geq 0 \\ -8 \quad -8 \end{array} \quad ; \quad \begin{array}{r} 4x \geq -8 \\ 4 \quad 4 \end{array}$$

$$x \geq -2$$

$$\{x \mid x \geq -2\}$$

$$(27) \quad h(x) = \frac{4}{2x+6}$$

$$\begin{array}{r} 2x + 6 = 0 \\ -6 \quad -6 \end{array} \quad ; \quad \begin{array}{r} 2x \geq -6 \\ 2 \quad 2 \end{array} \quad ; \quad x \neq -3$$

$$\{x \mid x \neq -3\}$$

$$(28) \quad (f \circ g)(x) = f[g(x)]$$

$$= f[\sqrt{4x+8}]$$

$$= (\sqrt{4x+8})^2 - 2\sqrt{4x+8} + 4$$

$$= 4x+8 - 2\sqrt{4x+8} + 4$$

$$= \boxed{4x - 2\sqrt{4x+8} + 12}$$

$$\begin{aligned}
 (29) \quad (g \circ f)(x) &= g[f(x)] \\
 &= g[x^2 - 2x + 4] \\
 &= \sqrt{4(x^2 - 2x + 4) + 8} \\
 &= \sqrt{4x^2 - 8x + 16 + 8} \\
 &= \sqrt{4x^2 - 8x + 24}
 \end{aligned}$$

$$\begin{array}{ll}
 (30) \quad (1) \quad y = 4x + 1 & (31) \quad (1) \quad y = \sqrt{x+3} \\
 (2) \quad x = 4y + 1 & (2) \quad x = \sqrt{y+3} \\
 (3) \quad \text{Solve for } y & (3) \quad \text{Solve for } y
 \end{array}$$

$$\begin{array}{rcl}
 x & = & 4y + 1 \\
 -1 & & -1
 \end{array}$$

$$\frac{x-1}{4} = \frac{4y}{4} ;$$

$$y = \frac{x-1}{4}$$

$$(4) \quad \left| \bar{f}(x) = \frac{x-1}{4} \right|$$

$$\begin{array}{rcl}
 x^2 & & \\
 x^2 & = & (\sqrt{y+3})^2
 \end{array}$$

$$\begin{array}{rcl}
 x^2 & = & y + 3 \\
 -3 & & -3
 \end{array}$$

$$x^2 - 3 = y : y = x^2 - 3$$

$$(4) \quad \left| \bar{f}(x) = x^2 - 3 \right|$$

$$(32) \quad (1) \quad y = x^3 - 4$$

$$(2) \quad x = y^3 - 4$$

(3) Solve for y

$$x = y^3 - 4$$

$$+4 \quad +4$$

$$x+4 = y^3$$

$$y^3 = x+4$$

$$\sqrt[3]{y^3} = \sqrt[3]{x+4}$$

$$y = \sqrt[3]{x+4}$$

$$(4) \quad \boxed{f'(x) = \sqrt[3]{x+4}}$$

$$(33) \quad f(x) = x^2 + 5, \quad x \geq 0$$

$$(1) \quad y = x^2 + 5, \quad x \geq 0$$

$$(2) \quad x = y^2 + 5$$

(3) Solve for y

$$x = y^2 + 5$$

$$-5 \quad -5$$

$$x-5 = y^2$$

$$y^2 = x-5$$

$$y = \pm \sqrt{x-5}$$

$$y = \sqrt{x-5}$$

$$(4) \quad \boxed{f'(x) = \sqrt{x-5}}$$