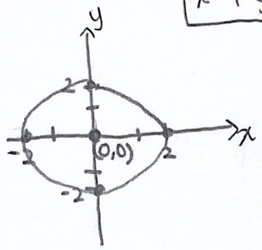
CH. 2.4 HW Q 11, 17, 19, 21, 23, 25, 27, 35, 37

11) $r = 2$; $(h,k) = (0,0)$

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

$\boxed{x^2 + y^2 = 4}$

general form = $\boxed{x^2 + y^2 - 4 = 0}$



17) $r = 4$; $(h,k) = (-2,1)$

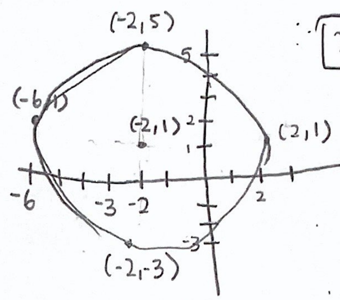
Standard form: $(x-(-2))^2 + (y-1)^2 = (4)^2$

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

general form: $x^2 + 4x + 4 + y^2 - 2y + 1 = 16$

$x^2 + y^2 + 4x - 2y + 5 = 16$
$\qquad\qquad\qquad\quad -16 \;\; -16$

$\boxed{x^2 + y^2 + 4x - 2y - 11 = 0}$



19.) $r = \frac{1}{2}$; $(h,k) = (\frac{1}{2}, 0)$

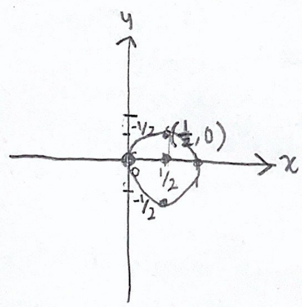
Standard form: $(x - \frac{1}{2})^2 + (y-0)^2 = (\frac{1}{2})^2$

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

general form: $(x - \frac{1}{2})^2 + y^2 - \frac{1}{4} = 0$

$x^2 - x + \cancel{\frac{1}{4}} + y^2 - \cancel{\frac{1}{4}} = 0$

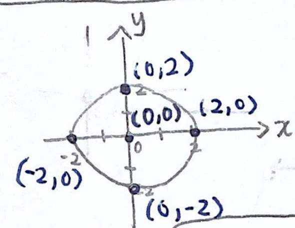
$\boxed{x^2 + y^2 - x = 0}$



21) $x^2 + y^2 = 4_{r^2}$

a) $\boxed{\text{center}: (0,0),\ \text{radius} = 2}$

b)



c) $x^2 + 0^2 = 4$

$x^2 = \sqrt{4}$

$x = \pm 2$

$\boxed{x \text{ intercepts } (-2,0) \text{ and } (2,0)}$

y intercept: $0^2 + y^2 = 4$

$\sqrt{4}$ $\quad y = \pm 2$

$\boxed{y \text{ intercept } (0,-2) \text{ and } (0,2)}$

23) $2(x-3)^2 + 2y^2 = 8$

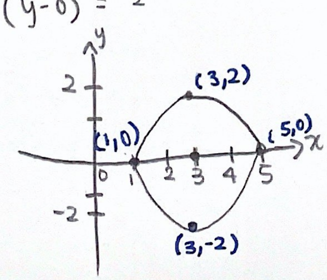
a) $\frac{2(x-3)^2}{2} + \frac{2y^2}{2} = \frac{8}{2}$

$(x-3)^2 + y^2 = 4$

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

$\boxed{\begin{array}{l}\text{center } (h,k) = (3,0) \\ \text{radius} = 2\end{array}}$

b)



c) $(x-3)^2 + 0^2 = 4$

$(x-3)^2 = 4$

$x - 3 = \pm 2 + 3$

$+3$

$x = 5, x = 1$

$\boxed{x \text{ intercept} = (1,0), (5,0)}$

$(0-3)^2 + y^2 = 4$

$(-3)^2 + y^2 = 4$ no real solution.

$9 + y^2 = 4 - 9$

$-9 \qquad y^2 = 5$

25) $x^2+y^2-2x-4y-4=0$

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

$(x^2-2x+1)+(y^2-4y+4)=9$

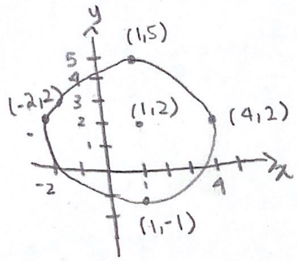
$\Downarrow \quad \Downarrow$

$(x-1)(x-1) \quad (y-2)(y-2)$

$(x-1)^2+(y-2)^2=9 \quad \sqrt{9}=r$

a) $\boxed{h,k \quad (1,2) \quad \text{radius}: 3}$

b)



c) $(x-1)^2+(0-2)^2=9$

$(x-1)^2+4=9-4$

-4

$(x-1)^2=5 \quad x-1=\pm\sqrt{5}$

$\boxed{x \text{ intercepts}: (1-\sqrt{5},0);\ (1+\sqrt{5},0)}$

$(0-1)^2+(y-2)^2=3^3$

$1+(y-2)^2=9 \quad -1$

$-1 \quad \sqrt{(y-2)^2}=\sqrt{8}$

$y-2=\pm\sqrt{8}$

$+2 \quad +2$

$y=2\pm2\sqrt{2}$

$\boxed{y \text{ intercept}: (0,2-2\sqrt{2});\ (0,2+2\sqrt{2})}$

35.) center @ origin $\to(-2,3)$

$x^2+y^2=r^2$

$(-2)^2+(3)^2=r^2$

$4 \quad 9$

$r^2=4+9 \quad \boxed{x^2+y^2=13}$

$r^2=13$

27) $x^2+y^2+4x-4y-1=0$

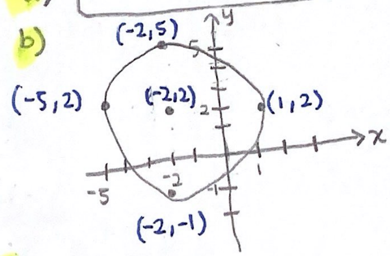
$(x^2+4x+4)+(y^2-4y+4)=1+\underbrace{4+4}_{9}$

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

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

a) $\boxed{\text{center}: (-2,2) \quad r=3}$

b)



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

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

-4

$\sqrt{(x+2)^2}=\sqrt{5}$

$x=-2\pm\sqrt{5}$

$\boxed{x \text{ intercepts}: (-2+\sqrt{5},0);\ (-2-\sqrt{5},0)}$

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

$4+(y-2)^2=9$

$\sqrt{(y-2)^2}=\sqrt{5}$

$y=2\pm\sqrt{5}$

$\boxed{y \text{ intercepts}: (0,2+\sqrt{5});\ (0,2-\sqrt{5})}$

37.) center $(2,3)$; tangent to the x axis

$\Downarrow$

radius is y coordinate of center.

$r=3$

$\boxed{(x-2)^2+(y-3)^2=9}$

CH. 3.1 HW Q. 27, 31, 32, 33, 37, 39, 47, 51, 53, 57, 61, 67

27. $y = x^2$

yes, $y = x^2$ describes y as a function of x

31. $y^2 = 4 - x^2 = y = \pm\sqrt{4-x^2}$

no, the equation does not define y as a function of x

32. $y = \pm\sqrt{1-2x}$

No, the equation does not define y as a function of x.

33. $x = y^2$

$\sqrt{y^2} = \sqrt{x}$

$= \pm\sqrt{x}$

No, the equation does not define y as a function of x.

37. $2x^2 + 3y^2 = 1$

$\frac{3y^2}{3} = \frac{1-2x^2}{3} = y \pm \sqrt{\frac{1-2x^2}{3}}$

NO, the equation does not define y as a function of x.

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

a) $f(0) = 3(0)^2 + 2(0) - 4$

$0 + 0 - 4$

$\boxed{f(0) = -4}$

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

$= \underbrace{3+2}_{5} - 4$

$\boxed{f(1) = 1}$

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

$= 3 - 2 - 4$

$\boxed{f(-1) = -3}$

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

$\boxed{f(-x) = 3x^2 - 2x - 4}$

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

$\boxed{-f(x) = -3x^2 - 2x + 4}$

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

$(x+1)(x+1)$

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

$= 3x^2 + 6x + 3 + 2x + 2 - 4$

$\boxed{f(x+1) = 3x^2 + 8x + 1}$

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

$= 3(4x^2) + 2(2x) - 4$

12

$\boxed{f(2x) = 12x^2 + 4x - 4}$

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

$= 3(x^2 + 2xh + h^2) + 2x + 2h - 4$

$\boxed{f(x+h) = 3x^2 + 6xh + 3h^2 + 2x + 2h - 4}$

47. $f(x) = -5x + 4$

all real numbers

51. $g(x) = \frac{x}{x^2 - 16}$ $\neq 0$

$x^2 - 16 = 0$ $+16$

$+16$

$x^2 = \sqrt{16}$

$x = \pm 4$

$-4, 4$

$\boxed{\{x \mid x \neq -4, x \neq 4\}}$

all real numbers but $x \neq -4, x \neq 4$

53. $F(x) = \frac{x-2}{x^3 + x}$

$x^3 + x = 0$

$x(x^2 + 1) = 0$

$x^2 + 1 \geq 1$

$x^2 + 1 = 0$

$-1 \quad -1$

$x^2 \neq -1$

$\boxed{\{x \mid x \neq 0\}}$

57. $f(x) = \frac{4}{\sqrt{x-9}}$

$x - 9 \geq 0$ $+9$

$+9$

$x \geq 9$

$\sqrt{x-9} = 0$

$(\sqrt{x-9})^2 = 0^2$

$x - 9 = 0$

$+9$

$x = 9$

$\boxed{\{x \mid x > 9\}}$

61. $p(t) = \frac{\sqrt{t-4}}{3t - 21}$

$t - 4 \geq 0$

$\boxed{t \geq 4}$

$\boxed{\{t \mid t \geq 4, t \neq 7\}}$

$3t - 21 = 0$

$+21$

$\frac{3t}{3} = \frac{21}{3}$

$\boxed{t \neq 7}$

67) $f(x)=\sqrt{x}$; $g(x)=3x-5$

a) $(f+g)(x)=\boxed{\sqrt{x}+3x-5}$ $\boxed{\text{Domain}=\{x \mid x \geq 0\}}$

$f(x)=\sqrt{x}$

$x<0$

$g(x)=3x-5$

(all real #)

b) $(f-g)(x) = \sqrt{x}-(3x-5)$

$\boxed{(f-g)(x) = \sqrt{x}-3x+5}$

$f(x)= \sqrt{x}$ $x<0$ Domain $= \{x \mid x \geq 0\}$

$g(x)=$ all real #

c) $(f \cdot g)(x) = f(x) \cdot g(x)$

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

$\boxed{(f \cdot g)(x) = 3x\sqrt{x} - 5\sqrt{x}}$

$f(x)=\sqrt{x} = \boxed{\{x \mid x \geq 0\}}$

$x<0$

$g(x)=3x-5$

↳ all real #

D) $\left(\frac{f}{g}\right)x = \frac{f(x)}{g(x)}$

$\boxed{\left(\frac{f}{g}\right)(x) = \frac{\sqrt{x}}{3x-5}}$

$f(x)=\sqrt{x}$ is $\{x \mid x \geq 0\}$

$\boxed{\text{Domain}: \{x \mid x \geq 0, x \neq \tfrac{5}{3}\}}$

$3x-5=0$

$+5$

$\frac{3x}{3}=\frac{5}{3}$

$x=\frac{5}{3}$ $= x \neq \frac{5}{3}$

e) $(f+g)(3)$

$f(x)+g(x) = \sqrt{x}+3x-5$

$(f+g)(3)$

$(f+g)(3) = \sqrt{3}+3(3)-5$

$= \sqrt{3}+9-5$

$\boxed{(f+g)(3) = \sqrt{3}+4}$

f) $(f-g)(4)$

↳ $f(x)-g(x) = (\sqrt{x})-(3x-5)$

$= \sqrt{x}-3x+5$

$f(4)-g(4) = \sqrt{4}-3(4)+5$

$2-12+5$

$\boxed{(f-g)(4) = -5}$

g) $(f \cdot g)(2)$

$(f \cdot g)(x) = 3x\sqrt{x}-5\sqrt{x}$

$(f \cdot g)(2) = 3(2)\sqrt{2}-5\sqrt{2}$

$= 6\sqrt{2}-5\sqrt{2}$

$\boxed{(f \cdot g)(2) = \sqrt{2}}$

h) $\left(\frac{f}{g}\right)(x) = \frac{\sqrt{x}}{3x-5}$ (1)

$\left(\frac{f}{g}\right)(1) = \frac{\sqrt{1}}{3(1)-5} = \frac{1}{3-5} = \frac{1}{-2}$

$\boxed{\left(\frac{f}{g}\right)(1) = -\frac{1}{2}}$