1.2 #32: $|2-16t| = 0$,

so $2-16t = 0$

$16t = 2$

$t = \frac{2}{16} = \boxed{\frac{1}{8}}$

1.2 #34:

$\left|\frac{x+1}{x-2}\right| = 4$

$\frac{x+1}{x-2} = 4$ or $\frac{x+1}{x-2} = -4$

$\frac{x+1}{x-2} - 4 = 0$ $\qquad$ $\frac{x+1}{x-2} + 4 = 0$

$\frac{x+1-4(x-2)}{x-2} = 0$ $\qquad$ $\frac{x+1+4(x-2)}{x-2} = 0$

$\frac{-3x+9}{x-2} = 0$ $\qquad$ $\frac{5x-7}{x-2} = 0$

$-3x+9 = 0$ $\qquad$ $5x-7 = 0$

$x = \frac{-9}{-3}$ $\qquad$ $x = \frac{7}{5}$

$\boxed{x = 3 \text{ or } x = \frac{7}{5}}$

1.2 #40: $|5-\frac{1}{3}x| < \frac{1}{2}$

$-\frac{1}{2} < 5-\frac{1}{3}x < \frac{1}{2}$

$-\frac{1}{2}-5 < -\frac{1}{3}x < \frac{1}{2}-5$

$-\frac{11}{2} < -\frac{1}{3}x < -\frac{9}{2}$

$\frac{33}{2} > x > \frac{27}{2}$

$\boxed{\therefore \left(\frac{27}{2}, \frac{33}{2}\right)}$

1.2 #44: $\left|\frac{2-5x}{3}\right| \geq 5$

$\frac{2-5x}{3} \geq 5$ or $\frac{2-5x}{3} \leq -5$

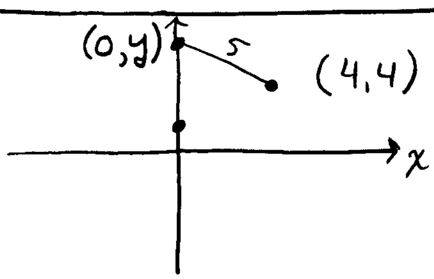
$2-5x \geq 15$ $\qquad$ $2-5x \leq -15$

$-5x \geq 13$ $\qquad$ $-5x \leq -17$

$x \leq -\frac{13}{5}$ $\qquad$ $x \geq \frac{17}{5}$

$\boxed{\therefore \left(-\infty, \frac{-13}{5}\right] \cup \left[\frac{17}{5}, \infty\right)}$

1.3 #38:



$\therefore$ distance from $(0,y)$ to $(4,4)$ is 5

$\therefore 5 = \sqrt{(4-0)^2 + (4-y)^2}$

$5 = \sqrt{16 + (4-y)^2}$

$25 = 16 + (4-y)^2$

$9 = (4-y)^2$

$\pm 3 = 4-y$

$y = 4 \pm 3 = 7, 1$

$\boxed{\therefore \text{points are } (0,1) \text{ \& } (0,7)}$

1.3 #40: Is $d(A,B) + d(B,C) = d(A,C)$?

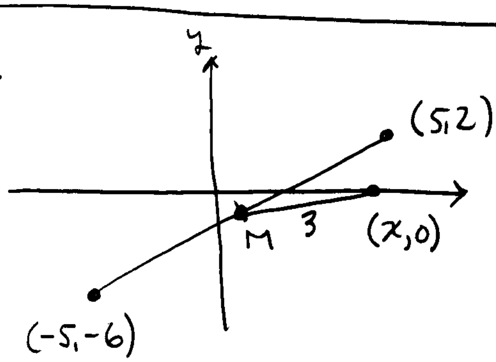
$$d(A,B) = \sqrt{(2-(-1))^2 + (4-(-5))^2} = 3\sqrt{10}$$
$$d(B,C) = \sqrt{(4-2)^2 + (10-4)^2} = 2\sqrt{10}$$
$$d(A,C) = \sqrt{(4-(-1))^2 + (10-(-5))^2} = 5\sqrt{10}$$

$\therefore$ Yes, $d(A,B) + d(B,C) = 5\sqrt{10} = d(A,C)$, so points do lie on a straight line.

1.3 #48: $A = (x,x)$, $B = (-x, x+2)$

$$M = \left(\frac{x+(-x)}{2}, \frac{x+(x+2)}{2}\right) = \left(\frac{0}{2}, \frac{2x+2}{2}\right) = \boxed{(0, x+1)}$$

1.3 #54:



$$M = \left(\frac{5+(-5)}{2}, \frac{2+(-6)}{2}\right)$$
$$= (0, -2)$$

Now solve

$$3 = \sqrt{(x-0)^2 + (0-(-2))^2}$$
$$3 = \sqrt{x^2+4}$$
$$9 = x^2+4$$
$$x^2 = 5$$
$$x = \sqrt{5}, -\sqrt{5}$$

$\therefore$ Points are $(\sqrt{5},0)$, $(-\sqrt{5},0)$

1.4 #14: $\frac{1}{2}x^2 + \frac{1}{2}y^2 + \frac{5}{2}x + 10y + 5 = 0$) multiplying through by 2.

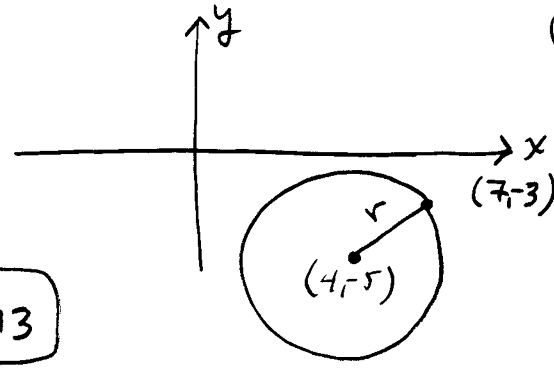
$$x^2 + y^2 + 5x + 20y + 10 = 0$$
$$x^2 + 5x \quad + y^2 + 20y \quad + 10 = 0$$
$$\left(x+\frac{5}{2}\right)^2 - \frac{25}{4} + (y+10)^2 - 100 + 10 = 0$$
$$\left(x+\frac{5}{2}\right)^2 + (y+10)^2 = \frac{385}{4}$$

$\therefore$ centre $\left(-\frac{5}{2}, -10\right)$

radius $\sqrt{\frac{385}{4}} = \frac{\sqrt{385}}{2}$

1.4 #22:

$$r = \sqrt{(7-4)^2 + (-3-(-5))^2}$$
$$= \sqrt{9+4}$$
$$= \sqrt{13}$$



$\therefore$ equation is $\boxed{(x-4)^2 + (y+5)^2 = 13}$

1.4 #48: $y = (x-2)^2(x+2)^2$

x-intercepts: $0 = (x-2)^2(x+2)^2$

$\therefore x = 2, \; x = -2$

$\therefore (2,0), \; (-2,0)$

y-intercepts: $y = (0-2)^2(0+2)^2 = 16$

$\therefore (0,16)$

Symmetry: x-axis:

$$y = (x-2)^2(x+2)^2$$
$$y \leftrightarrow -y:$$
$$-y = (x-2)^2(x+2)^2$$

not equivalent, so no x-axis symmetry.

y-axis:

$$y = (x-2)^2(x+2)^2$$
$$x \longleftrightarrow -x:$$
$$y = (-x-2)^2(-x+2)^2$$
$$y = \left((-1)(x+2)\right)^2 \left((-1)(x-2)\right)^2$$
$$y = (x+2)^2(x-2)^2$$

equivalent, so graph has y-axis symmetry.

origin:

$$y = (x-2)^2(x+2)^2$$
$$x, y \leftrightarrow -x, -y:$$
$$-y = (-x-2)^2(-x+2)^2$$
$$-y = (x+2)^2(x-2)^2$$

not equivalent, so no symmetry about origin

1.4 #54 : $y = \frac{x^2-10}{x^2+10}$

x-intercepts: $0 = \frac{x^2-10}{x^2+10}$

$x^2 - 10 = 0$

$x = \pm\sqrt{10}$, $\therefore (\sqrt{10}, 0), (-\sqrt{10}, 0)$.

y-intercepts: $y = \frac{0^2-10}{0^2+10} = -1$

$\therefore (0,-1)$.

symmetry: x-axis : $y = \frac{x^2-10}{x^2+10}$

$y \leftrightarrow -y$:

$-y = \frac{x^2-10}{x^2+10}$

not equivalent, so not symmetric about x-axis

y-axis: $y = \frac{x^2-10}{x^2+10}$

$x \leftrightarrow -x$:

$y = \frac{(-x)^2-10}{(-x)^2+10}$

$y = \frac{x^2-10}{x^2+10}$

equivalent, so symmetric about y-axis

origin: $y = \frac{x^2-10}{x^2+10}$

$x, y \leftrightarrow -x, -y$:

$-y = \frac{(-x)^2-10}{(-x)^2+10}$

$-y = \frac{x^2-10}{x^2+10}$

not equivalent, so not symmetric about origin

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201 #14: $f(x) = \frac{2x}{\sqrt{3x-1}}$: Domain of f : must have

$3x - 1 > 0$

$3x > 1$

$x > \frac{1}{3}$

$\boxed{\therefore \left(\frac{1}{3}, \infty\right)}$

5

2.1 #26: $f(x) = \sqrt{\frac{5-x}{x}}$: Domain of f: must have $\frac{5-x}{x} \geq 0$

$5-x=0$, $x=0$

$x=5$, $x=0$

$5-x$:	$+$		$+$		$-$
x:	$-$		$+$		$+$
$\frac{5-x}{x}$:	$-$	N/A	$+$	0	$-$
	-1	0	1	5	6

$\therefore \frac{5-x}{x} \geq 0$ on $\boxed{(0, 5]}$.

2.1 #42: $f(x) = 2-\sqrt{4-x^2}$.

$f(x)=0 \Rightarrow 2-\sqrt{4-x^2}=0$

$2=\sqrt{4-x^2}$

$4 = 4-x^2$

$x^2=0$

$\boxed{x=0}$

2.1 #48: $f(x) = \frac{x(x+1)(x-6)}{x+8}$

x-intercepts: $0 = \frac{x(x+1)(x-6)}{x+8}$

$\therefore x(x+1)(x-6) = 0$

$x=0$, $x+1=0$, $x-6=0$

$x=0$, $x=-1$, $x=6$

$\boxed{\therefore (0,0), (-1,0), (6,0)}$

y-intercepts: $f(0) = \frac{0(0+1)(0-6)}{0+8} = 0$

$\boxed{\therefore (0,0)}$

2.2 #8: $f(x) = \sqrt{x^3+x}$

Odd:
$$\begin{aligned} f(-x) &= \sqrt[3]{(-x)^3+(-x)} \\ &= \sqrt[3]{-x^3-x} \\ &= \sqrt[3]{(-1)(x^3+x)} \\ &= -\sqrt[3]{x^3+x} \\ &= -f(x) \end{aligned}$$

$f(-x) = -f(x)$, so f is odd,

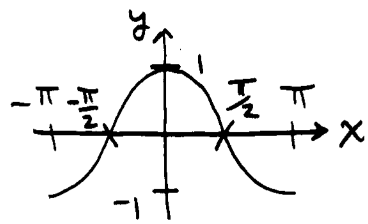
Even: $f(-x) = -\sqrt[3]{x^3+x} \neq f(x)$, so f is not even

2.2 #10: $f(x) = x|x|$

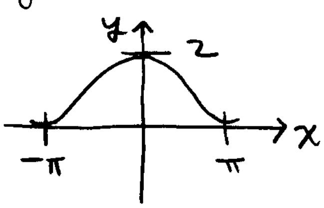
Odd: $f(-x) = (-x)|-x| = -x|x| = -f(x)$, so f is odd.

Even: $f(-x) = -x|x| \neq f(x)$, so f is not even.

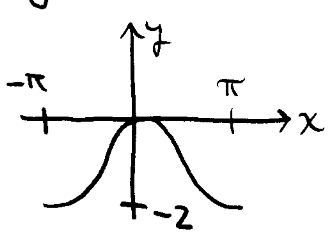
2.2 #38: $f(x)$:



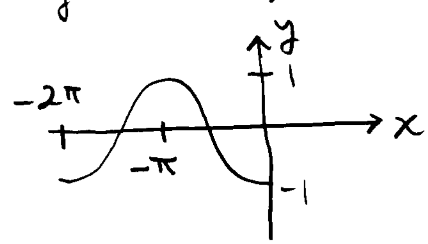
(a). $y = f(x) + 1$:



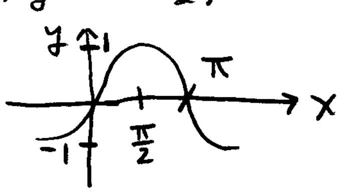
(b) $y = f(x) - 1$:



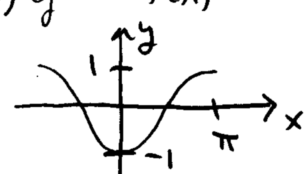
(c) $y = f(x+\pi)$



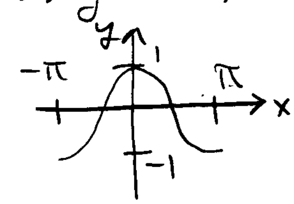
(d) $y = f(x - \frac{\pi}{2})$:



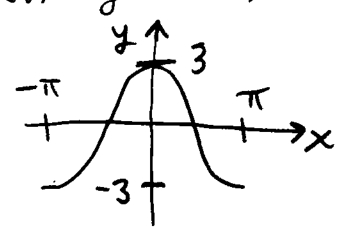
(e) $y = -f(x)$:



(f) $y = f(-x)$:



(g) $y = 3f(x)$



(h) $y = -\frac{1}{2} f(x)$: