

CHAPTER P PRACTICE TEST

P.1

1. $y = \sqrt{9-x}$ x-int set $y=0$, solve for x
 y-int set $x=0$, solve for y

x-int:

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

$$0 = 9-x$$

+x +x

$$x=9$$

y-int:

$$y = \sqrt{9-0}$$

$$y = \sqrt{9}$$

$$y=3$$

2. $y = \frac{x^2+3x}{(3x+1)^2}$

x-int:

to make a fraction = 0, only
 the top needs to = 0.

$$(3x+1)^2 \cdot 0 = \frac{x^2+3x}{(3x+1)^2}$$

$$0 = x^2+3x \leftarrow \text{quadratic}$$

(factor, q. formula, etc.)

$$0 = x(x+3)$$

$$x=0 \quad x+3=0$$

-3 -3

$$x=-3$$

y-int:

$$y = \frac{0^2+3(0)}{(3(0)+1)^2}$$

$$y = \frac{0}{1}$$

$$y=0$$

3. $y = x^3 - 4x$

$$y = (1)^3 - 4(1)$$

$$= 1-4$$

$$= -3$$

$$y = (-1)^3 - 4(-1)$$

$$-1+4 = 3$$

Plug in a 1 & -1 and compare
 results

opposites = origin symmetry

$$4. y = x^2 + 3$$

$$y = (1)^2 + 3 = 4$$

$$y = (-1)^2 + 3 = 4$$

} same = y-axis symmetry

$$5. x + y = 2$$

$$2x - y = 1$$

$$y = 2 - x$$

$$y = 2x - 1$$

① Set each equation = y

② Set the equations = to each other

③ Solve for x.

④ Substitute in for x to find y.

$$\begin{array}{r} 2 + x \\ -x \\ \hline 2 \end{array} = \begin{array}{r} 2 + x \\ -x - 1 \\ \hline 2x - 1 \end{array} \rightarrow \frac{3}{3} = \frac{3x}{3} \rightarrow 1 = x$$

find y:

$$y = 2 - (1) \rightarrow y = 1$$

$$\boxed{(1, 1)}$$

$$6. x^2 + y = 6$$

$$y = 6 - x^2$$

$$x + y = 4$$

$$y = 4 - x$$

$$\begin{array}{r} 6 - x^2 \\ -6 + x^2 \\ \hline -x^2 \end{array} = \begin{array}{r} 4 - x \\ -6 + x^2 \\ \hline -x^2 - x + 4 \end{array} \leftarrow \text{quadratic } (x^2), \text{ so set } = 0$$

$$0 = x^2 - x - 2 \text{ (Factor, Q.F., etc)}$$

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

$$\begin{array}{r} x - 2 = 0 \\ +2 +2 \\ \hline x \end{array}$$

$$\begin{array}{r} x + 1 = 0 \\ -1 -1 \\ \hline x \end{array}$$

$$x = 2, -1$$

$$\text{find } y: y = 4 - (2) = 2$$

$$\boxed{(2, 2)}$$

$$y = 4 - (-1) = 5$$

$$\boxed{(-1, 5)}$$

P.2

$$7. (-3, -4), (1, 4)$$

$$m = \frac{4 - (-4)}{1 - (-3)} = \frac{8}{4} = 2$$

① Find slope

② Use point-slope form

③ get y by itself

$$y - 4 = 2(x - 1)$$

$$\begin{array}{r} y - 4 = 2x - 2 \\ +4 +4 \\ \hline y = 2x + 2 \end{array}$$

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

8. (1, -2) (5, 1)

$$m = \frac{1 - (-2)}{5 - 1} = \frac{3}{4}$$

$$y - 1 = \frac{3}{4}(x - 5)$$

$$y - 1 = \frac{3}{4}x - \frac{15}{4} \quad \left(\frac{3}{4} \times 5 = \frac{15}{4}\right)$$

Common Den.

$$y = \frac{3}{4}x - \frac{11}{4} \quad \left(-\frac{15}{4} + \frac{4}{4} = -\frac{11}{4}\right)$$

9. (3, 7) (12, 7)

$$m = \frac{7 - 7}{12 - 3} = \frac{0}{9} = 0$$

$$y - 7 = 0(x - 3)$$

$$y - 7 = 0 \quad \boxed{y = 7}$$

10. (4, -8), (4, 2)

$$m = \frac{2 - (-8)}{4 - 4} = \frac{10}{0} = \text{undefined}$$

vertical line (x = ?)

$$\boxed{x = 4}$$

11. (2, 1) $4x - 2y = 3$ ① get y by itself

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

② parallel lines have same slope

③ perpendicular have opposite reciprocal slopes

$$y = 2x - \frac{3}{2}$$

$$m = 2$$

④ use point-slope form, get y by itself

parallel:

$$y - 1 = 2(x - 2)$$

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

+1 +1

$$\boxed{y = 2x - 3}$$

perpendicular:

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

$$y - 1 = -\frac{1}{2}x + 1$$

+1 +1

$$\boxed{y = -\frac{1}{2}x + 2}$$

12. (2, 5) $y = -3$ ← horizontal line (slope = 0)
 parallel: $y = 5$
 perpendicular (vertical): $x = 2$

P.3

13. $f(x) = 4 + x^2$ ① Substitute for x .

a) $f(0) = 4 + (0)^2 = 4$ ② Simplify

b) $f(-2) = 4 + (-2)^2 = 8$

c) $f(\sqrt{5}) = 4 + (\sqrt{5})^2 = 9$

d) $f(b+3) = 4 + (b+3)^2 = 4 + (b+3)(b+3) = 4 + b^2 + 6b + 9$
 $= b^2 + 6b + 13$ ~~$+ 13$~~

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

a) $f(-2) = \sqrt{-2+3} = \sqrt{1} = 1$

b) $f(6) = \sqrt{6+3} = \sqrt{9} = 3$

c) $f(t^2) = \sqrt{t^2+3}$

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

BONUS: $f(x) = x^2$

$$\frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$f(x+\Delta x) = (x+\Delta x)^2 =$ ~~$x^2 + 2x\Delta x + (\Delta x)^2$~~ $(x+\Delta x)(x+\Delta x)$

$$x^2 + x(\Delta x) + x(\Delta x) + (\Delta x)^2$$

$$x^2 + 2x(\Delta x) + (\Delta x)^2 - x^2$$

$$\Delta x$$

$$\frac{2x(\Delta x) + (\Delta x)^2}{\Delta x}$$

$$\Delta x$$

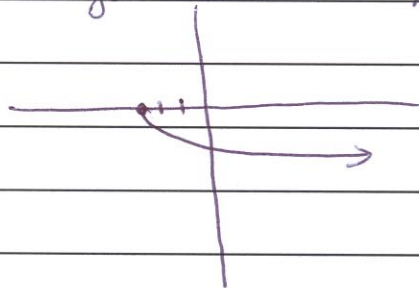
$$\boxed{2x + \Delta x}$$

$$15 \ h(x) = -\sqrt{x+3}$$

$$\text{Domain: } [-3, \infty)$$

$$x+3 \geq 0 \quad \boxed{x \geq -3}$$

$$\text{Range: } [-\infty, 0]$$



Domain:

① Even roots \rightarrow set inside ≥ 0

② Denominator \rightarrow set bottom $= 0$

Range:

Graph on calc.

(bottom to top)

$$16. \ g(x) = \frac{2}{x-1}$$

$$\text{Domain: } x-1$$

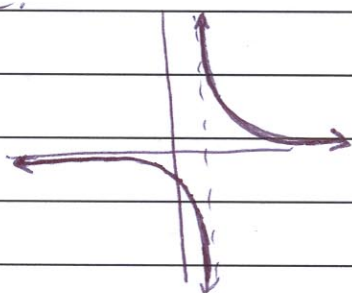
$$x-1=0 \quad x=1$$

$$+1 \quad +1$$

remove from domain

$(-\infty, 1) (1, \infty)$ or $x \neq 1$ or all real numbers except 1

Range:



$$(-\infty, 0) (0, \infty)$$

or all real numbers except 0

P.3

$$17a) \ f(g(3)) \quad g(3) = 3^2 + 3 = 12 \quad \text{① Plug number into inside function}$$

$$f(12) = \frac{2}{12} = \frac{1}{6} \quad \text{② Plug answer into outside function}$$

$$b) \ g(g(2)) \quad g(2) = 2^2 + 3 = 7$$

$$g(7) = 7^2 + 3 = \boxed{52}$$

$$c) \ f(g(\sqrt{5})) = g(\sqrt{5}) = (\sqrt{5})^2 + 3 = 8$$

$$f(8) = \frac{2}{8} = \frac{1}{4}$$

$$d) \ g(f(-4)) = f(-4) = \frac{2}{-4} = -\frac{1}{2}$$

$$g(-\frac{1}{2}) = (-\frac{1}{2})^2 + 3 = \frac{1}{4} + 3 = \frac{13}{4}$$

$$e) \ f(g(x)) = f(x^2 + 3) = \frac{2}{x^2 + 3}$$

$$f) \ g(f(x)) = g(\frac{2}{x}) = \left(\frac{2}{x}\right)^2 + 3 = \frac{4}{x^2} + 3 \quad \text{or} \quad \frac{4 + 3x^2}{x^2}$$

$$18. (f \circ g)(x) = f(\sin x) \\ = (\sin x)^3 = \boxed{\sin^3 x}$$

$$(g \circ f)(x) = g(x^3) \\ = \boxed{\sin(x^3)}$$

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

$$19. (f \circ g)(x) = f(g(x)) = f(x^2 + 2) = \boxed{\frac{2}{x^2 + 2}}$$

$$(g \circ f)(x) = g(f(x)) = g\left(\frac{2}{x}\right) = \boxed{\left(\frac{2}{x}\right)^2 + 2}$$

20. $x^2 + 1$ shift up 1

21. $(x-3)^2$ shift right 3

22. $3x^2$ vertical stretch

23. $-x^2$ reflect across x-axis

24. $\frac{1}{2}x^2$ horizontal stretch

25. $(-x)^2$ reflect across y-axis

① Add/sub to whole function is a vertical shift

② Add/sub to just x is a horizontal shift

③ Multiplying by a value

bigger than 1 is a vertical stretch

④ Multiplying by a value less than one is a horizontal stretch

⑤ ~~Multiplying~~ Changing the sign of x is a y-axis reflection

⑥ Changing the sign of the whole function is an x-axis reflection.

26. a) $-1.42x + 66.27 = y$ ① Place table data in calculator lists.

b)



② STAT \rightarrow CALC \rightarrow #4 Linreg(ax+b)
on calculator

③ 2nd \rightarrow y= to create the
scatterplot

④ put equation for part a in
y=

⑤ Choose ZOOM \rightarrow ZOOMSTAT to
graph

c) $-1.42(17) + 66.27 =$ 42.13 hours