

Quarter 1 Review (Unit 1)

(1-1a) Factor out the greatest common factor (GCF).

1) $10k^3 + 15k^2$

$$5k^2(2k+3)$$

2) $8x^2y - 2xy^2 + 4xy$

$$2xy(4x - y + 2)$$

3) $25b^2 + 10b$

$$5b(5b+2)$$

4) $28p^4 - 35p^3 + 42p^2$

$$7p^2(4p^2 - 5p + 6)$$

(1-2a) Factor each expression by grouping.

5) $2n^3 - 3n^2 - 8n + 12$

$$(2n^3 - 3n^2) + (-8n + 12)$$

$$n^2(2n - 3) - 4(2n - 3)$$

$$(n^2 - 4)(2n - 3)$$

$$(n+2)(n-2)(2n-3)$$

6) $5b^3 - 25b^2 + 7b - 35$

$$(5b^3 - 25b^2) + (7b - 35)$$

$$5b^2(b - 5) + 7(b - 5)$$

$$(5b^2 + 7)(b - 5)$$

7) $5b^3 - 4b^2 - 30b + 24$

$$(5b^3 - 4b^2) + (-30b + 24)$$

$$b^2(5b - 4) - 6(5b - 4)$$

$$(b^2 - 6)(5b - 4)$$

8) $28k^3 - 4k^2 + 7k - 1$

$$(28k^3 - 4k^2) + (7k - 1)$$

$$4k^2(7k - 1) + 1(7k - 1)$$

$$(4k^2 + 1)(7k - 1)$$

9) $5n^3 + 10n^2 - 7n - 14$

$$(5n^3 + 10n^2) + (-7n - 14)$$

$$5n^2(n + 2) - 7(n + 2)$$

$$(5n^2 - 7)(n + 2)$$

10) $18n^3 - 15n^2 + 42n - 35$

$$(18n^3 - 15n^2) + (42n - 35)$$

$$3n^2(6n - 5) + 7(6n - 5)$$

$$(3n^2 + 7)(6n - 5)$$

(1-2b) Factor each trinomial completely.

11) $7k^3 - 2k^2 - 9k$

$$k(7k^2 - 2k - 9)$$

$$k(7k^2 - 9k + 7k - 9)$$

$$k(k(7k - 9) + 1(7k - 9))$$

$$k(k+1)(7k-9)$$

$$\begin{array}{r} -63 \\ -9 \overline{) 7} \end{array}$$

12) $3n^2 + 37n + 90$

$$3n^2 + 10n + 27n + 90$$

$$n(3n+10) + 9(3n+10)$$

$$(n+9)(3n+10)$$

$$\begin{array}{r} 270 \\ 10 \overline{) 27} \end{array}$$

$$13) 7v^2 + 48v - 7$$

$$7v^2 - 49v + v - 7$$

$$7v(v-7) + 1(v-7)$$

$$(7v+1)(v-7)$$

$$\begin{array}{r} -49 \\ 49 \overline{) -1} \end{array}$$

$$14) 2a^2 - 13a - 7$$

$$2a^2 - 14a + a - 7$$

$$2a(a-7) + 1(a-7)$$

$$(2a+1)(a-7)$$

$$\begin{array}{r} -14 \\ -14 \overline{) 1} \end{array}$$

$$15) 9p^2 - 21p - 18$$

$$3(3p^2 - 7p - 6)$$

$$3(3p^2 - 9p + 2p - 6)$$

$$3(3p(p-3) + 2(p-3))$$

$$3(3p+2)(p-3)$$

$$\begin{array}{r} -18 \\ -9 \overline{) 2} \end{array}$$

$$16) 35n^3 - 15n^2 - 20n$$

$$5n(7n^2 - 3n - 4)$$

$$5n(7n^2 - 7n + 4n - 4)$$

$$5n(7n(n-1) + 4(n-1))$$

$$5n(7n+4)(n-1)$$

$$\begin{array}{r} 28 \\ -7 \overline{) 4} \end{array}$$

$$17) 3a^2 - 2a - 16$$

$$3a^2 - 8a + 6a - 16$$

$$a(3a-8) + 2(3a-8)$$

$$(a+2)(3a-8)$$

$$\begin{array}{r} -48 \\ -8 \overline{) 6} \end{array}$$

$$18) 5p^3 - 2p^2 - 3p$$

$$p(5p^2 - 2p - 3)$$

$$p(5p^2 - 5p + 3p - 3)$$

$$p(5p(p-1) + 3(p-1))$$

$$p(5p+3)(p-1)$$

$$\begin{array}{r} -15 \\ -5 \overline{) 3} \end{array}$$

(1-3a) Factor each difference of squares binomial.

$$19) x^2 - 16$$

$$(x+4)(x-4)$$

$$20) k^2 - 1$$

$$(k+1)(k-1)$$

$$21) 4a^2 - 9$$

$$(2a+3)(2a-3)$$

$$22) 16a^2 - 36$$

$$(4a+6)(4a-6)$$

Solve each equation.

$$23) 10 = 8n - 3 + 5n$$

$$10 = 13n - 3$$

$$\begin{array}{r} +3 \qquad +3 \\ \hline 13 = 13n \\ \hline \frac{13}{13} = \frac{13n}{13} \\ \hline \boxed{1 = n} \end{array}$$

$$24) -6v + 7v = 5$$

$$\boxed{v = 5}$$

$$25) k - 6 - 8 = -21$$

$$k - 14 = -21$$

$$+14 \quad +14$$

$$\boxed{k = -7}$$

$$26) -12 = 8n + 4 - 4n$$

$$-12 = 4n + 4$$

$$-4 \quad -4$$

$$\frac{-16}{4} = \frac{4n}{4}$$

$$\boxed{-4 = n}$$

Solve each equation by factoring.

$$27) n^2 - 9n + 20 = 0$$

$$\frac{20}{-5|-4}$$

$$n^2 - 5n - 4n + 20 = 0$$

$$n(n-5) - 4(n-5) = 0$$

$$(n-4)(n-5) = 0$$

$$n-4 = 0 \quad n-5 = 0$$

$$\boxed{n = 4 \quad n = 5}$$

$$29) b^2 - 4b = 0$$

$$b(b-4) = 0$$

$$\boxed{b = 0} \quad \boxed{b - 4 = 0}$$

$$\quad \quad \quad \boxed{b = 4}$$

$$31) r^2 - 3r + 2 = 0$$

$$\frac{2}{-2|-1}$$

$$r^2 - 2r - r + 2 = 0$$

$$r(r-2) - 1(r-2) = 0$$

$$(r-1)(r-2) = 0$$

$$r-1 = 0 \quad r-2 = 0$$

$$\boxed{r = 1 \quad r = 2}$$

$$33) n^2 = 16$$

$$\sqrt{n^2} = \sqrt{16}$$

$$n = \pm 4$$

$$\boxed{n = 4, n = -4}$$

$$35) b^2 = -10 - 7b$$

$$+10 + 7b \quad +10 + 7b$$

$$\frac{10}{2|5}$$

$$b^2 + 7b + 10 = 0$$

$$b^2 + 2b + 5b + 10 = 0$$

$$b(b+2) + 5(b+2) = 0$$

$$(b+5)(b+2) = 0$$

$$b+5 = 0 \quad b+2 = 0$$

$$\boxed{b = -5 \quad b = -2}$$

$$28) p^2 + 5p + 6 = 0$$

$$\frac{6}{2|3}$$

$$p^2 + 2p + 3p + 6 = 0$$

$$p(p+2) + 3(p+2) = 0$$

$$(p+3)(p+2) = 0$$

$$p+3 = 0 \quad p+2 = 0$$

$$\boxed{p = -3 \quad p = -2}$$

$$30) n^2 + 2n - 48 = 0$$

$$\frac{-48}{8|-6}$$

$$n^2 + 8n - 6n - 48 = 0$$

$$n(n+8) - 6(n+8) = 0$$

$$(n-6)(n+8) = 0$$

$$n-6 = 0 \quad n+8 = 0$$

$$\boxed{n = 6 \quad n = -8}$$

$$32) r^2 - 4r + 4 = 0$$

$$\frac{4}{-2|-2}$$

$$r^2 - 2r - 2r + 4 = 0$$

$$r(r-2) - 2(r-2) = 0$$

$$(r-2)(r-2) = 0$$

$$r-2 = 0 \quad r-2 = 0$$

$$\boxed{r = 2}$$

$$34) p^2 - 8 = -2p$$

$$\frac{-8}{4|-2}$$

$$+2p \quad +2p$$

$$p^2 + 2p - 8 = 0$$

$$p^2 + 4p - 2p - 8 = 0$$

$$p(p+4) - 2(p+4) = 0$$

$$(p-2)(p+4) = 0$$

$$\rightarrow p-2 = 0 \quad p+4 = 0$$

$$\boxed{p = 2 \quad p = -4}$$

$$36) b^2 - 20 = -b$$

$$\frac{-20}{5|-4}$$

$$+b \quad +b$$

$$b^2 + b - 20 = 0$$

$$b^2 + 5b - 4b - 20 = 0$$

$$b(b+5) - 4(b+5) = 0$$

$$(b-4)(b+5) = 0$$

$$b-4 = 0 \quad b+5 = 0$$

-3-

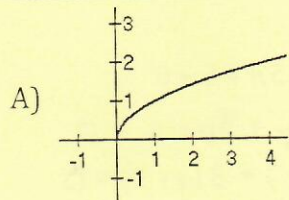
$$\boxed{b = 4 \quad b = -5}$$

Quarter 1 Review
Secondary Math 3

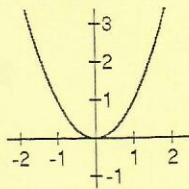
Unit 2

1. In the blank provided, name and write the equation for each parent function that corresponds to graphs given below. (2-1a)

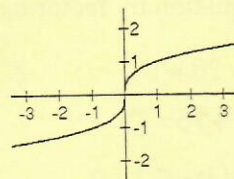
$f(x) = \sqrt{x}$ A)



B)

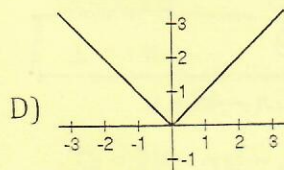


C)

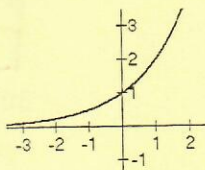


$f(x) = x^2$ B)

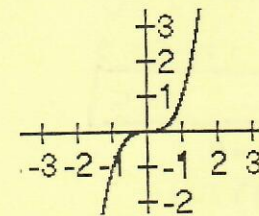
$f(x) = 2\sqrt{x}$ C)



E)



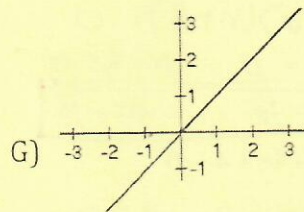
F)



$f(x) = |x|$ D)

$f(x) = 2^x$ E)

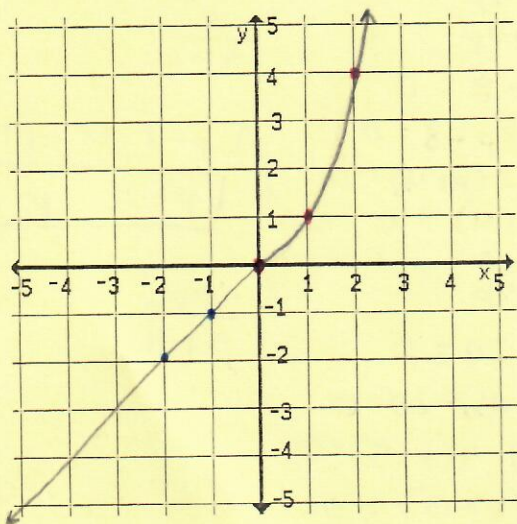
$f(x) = x^3$ F)



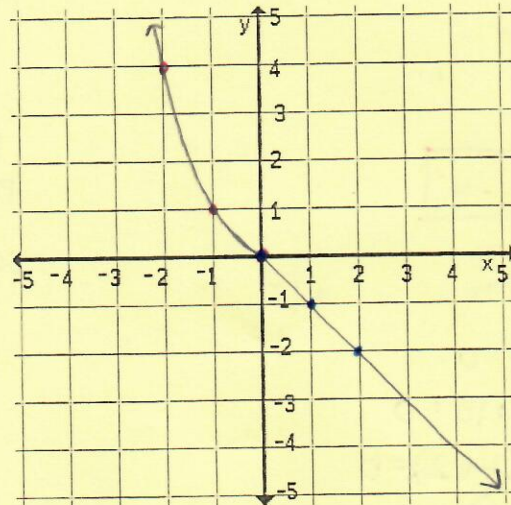
$f(x) = x$ G)

Graph the piece-wise functions (2-3a)

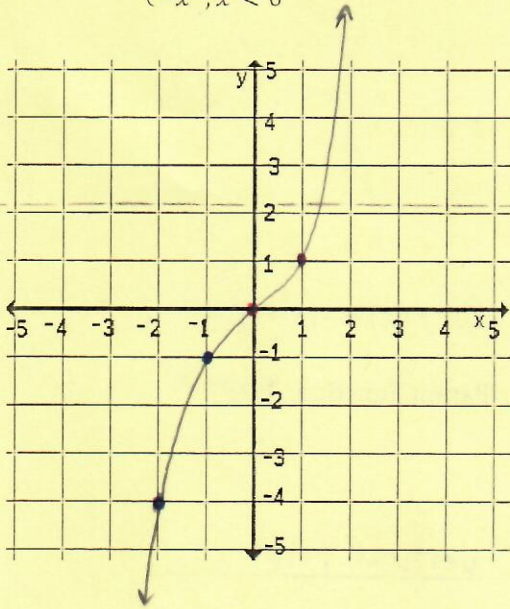
2. $f(x) = \begin{cases} x, & x < 0 \\ x^2, & x \geq 0 \end{cases}$



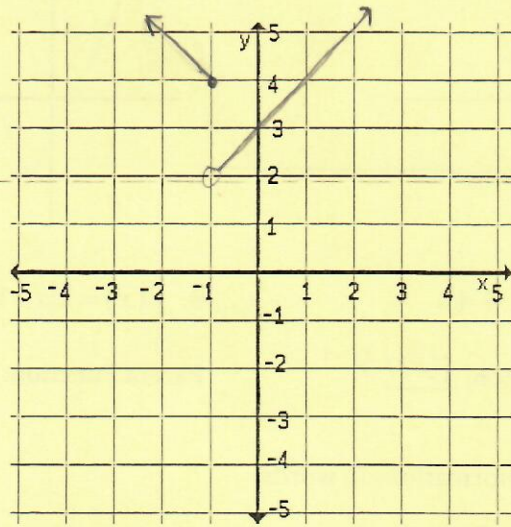
3. $f(x) = \begin{cases} -|x|, & x \geq 0 \\ x^2, & x < 0 \end{cases}$



$$4. f(x) = \begin{cases} x^3, & x \geq 0 \\ -x^2, & x < 0 \end{cases}$$

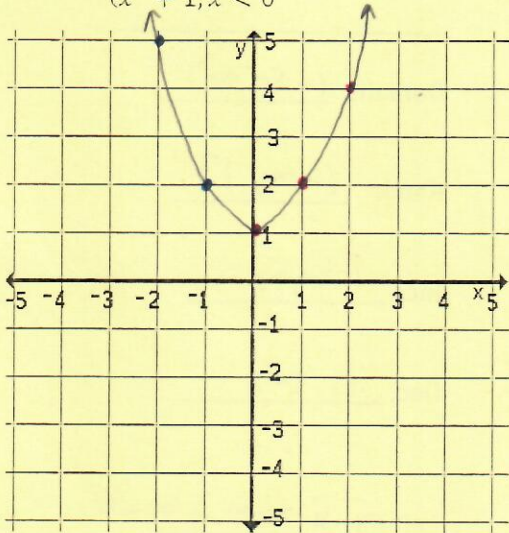


$$5. f(x) = \begin{cases} |x+3|, & x \leq -1 \\ x+3, & x > -1 \end{cases}$$

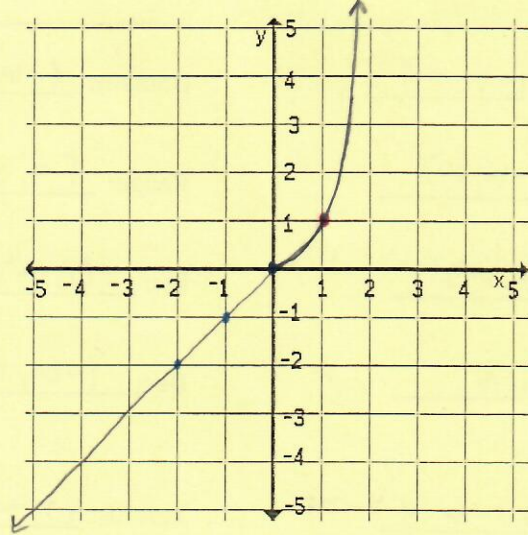


Graph the piece-wise functions (2-3a), then determine the Domain, Range, Increasing, Decreasing, and end behavior.

$$6. f(x) = \begin{cases} 2^x, & x \geq 0 \\ x^2 + 1, & x < 0 \end{cases}$$



$$7. f(x) = \begin{cases} x, & x \leq 0 \\ x^3, & x > 0 \end{cases}$$



Domain: $(-\infty, \infty)$

Range: $[1, \infty)$

Inc: $(0, \infty)$

Dec: $(-\infty, 0)$

Left EB: $x \rightarrow -\infty, y \rightarrow \infty$

Right EB: $x \rightarrow \infty, y \rightarrow \infty$

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

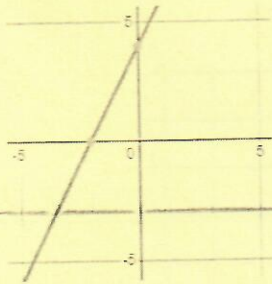
Inc: $(-\infty, \infty)$

Dec: n/a

Left EB: $x \rightarrow -\infty, y \rightarrow -\infty$

Right EB: $x \rightarrow \infty, y \rightarrow \infty$

For the following functions, identify the **parent function**, list the **transformations** involved, state the **domain and range**, where it is **increasing and decreasing**, and the **end behavior**. (2-1b, 2-2a)



8. $f(x) = 2x + 4$

Parent Function: $f(x) = x$

List the transformations in words:

vertical shift up 4

vertical stretch of 2

Domain: $(-\infty, \infty)$

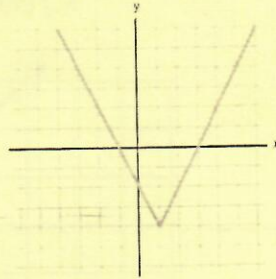
Range: $(-\infty, \infty)$

Inc: $(-\infty, \infty)$

Dec: N/A

Left EB: $x \rightarrow -\infty, y \rightarrow -\infty$

Right EB: $x \rightarrow \infty, y \rightarrow \infty$



9. $f(x) = 2|x-1| - 4$

Parent Function: $f(x) = |x|$

vertical stretch of 2

shift right 1

shift down 4

Domain: $(-\infty, \infty)$

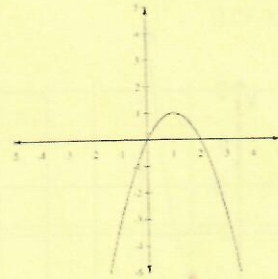
Range: $[-4, \infty)$

Inc: $(1, \infty)$

Dec: $(-\infty, 1)$

Left EB: $x \rightarrow -\infty, y \rightarrow \infty$

Right EB: $x \rightarrow \infty, y \rightarrow \infty$



10. $f(x) = -(x-1)^2 + 1$

Parent Function: $f(x) = x^2$

vertical flip

shift right 1

shift up 1

Domain: $(-\infty, \infty)$

Range: $(-\infty, 1]$

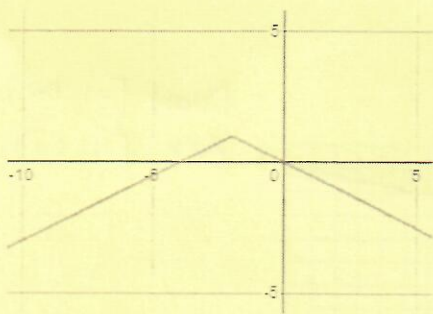
Inc: $(-\infty, 1)$

Dec: $(1, \infty)$

Left EB: $x \rightarrow -\infty, y \rightarrow -\infty$

Right EB: $x \rightarrow \infty, y \rightarrow -\infty$

For the following functions, identify the **parent function**, list the **transformations** involved, state the **domain and range**, where it is **increasing and decreasing**, and the **end behavior**. (2-1b, 2-2a)



11. $f(x) = -\frac{1}{2}|x + 2| + 1$

Parent Function: $f(x) = |x|$

List the transformations in words:

vertical flip &

stretch of $\frac{1}{2}$

shift left 2

shift up 1

Domain: $(-\infty, \infty)$

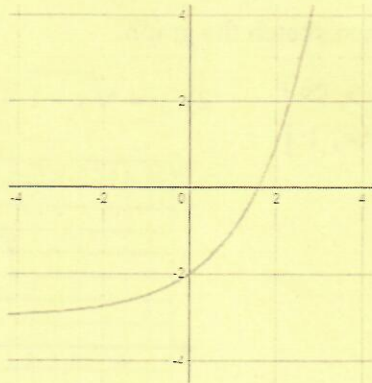
Range: $(-\infty, 1]$

Inc: $(-\infty, -2)$

Dec: $(-2, \infty)$

Left EB: $x \rightarrow -\infty, y \rightarrow -\infty$

Right EB: $x \rightarrow \infty, y \rightarrow -\infty$



12. $f(x) = 2^x - 3$

Parent Function: $f(x) = 2^x$

shift down 3

Domain: $(-\infty, \infty)$

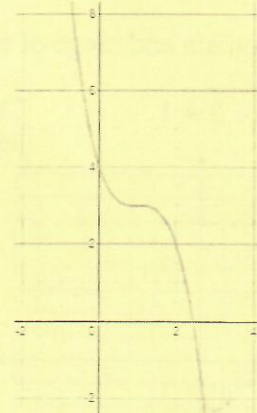
Range: $(-3, \infty)$

Inc: $(-\infty, \infty)$

Dec: N/A

Left EB: $x \rightarrow -\infty, y \rightarrow -3$

Right EB: $x \rightarrow \infty, y \rightarrow \infty$



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

Parent Function: $f(x) = x^3$

vertical flip

shift right 1

shift up 2

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

Inc: N/A

Dec: $(-\infty, \infty)$

Left EB: $x \rightarrow -\infty, y \rightarrow \infty$

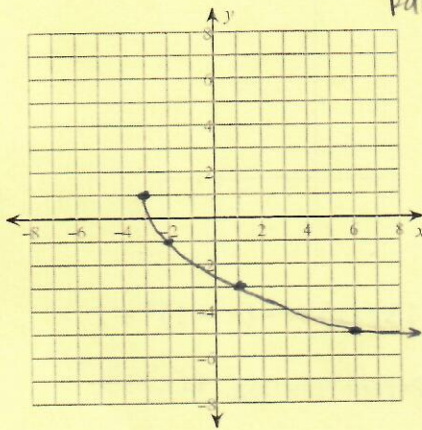
Right EB: $x \rightarrow \infty, y \rightarrow -\infty$

Unit 3 Final Review

Identify the domain and range of each. Then sketch the graph.

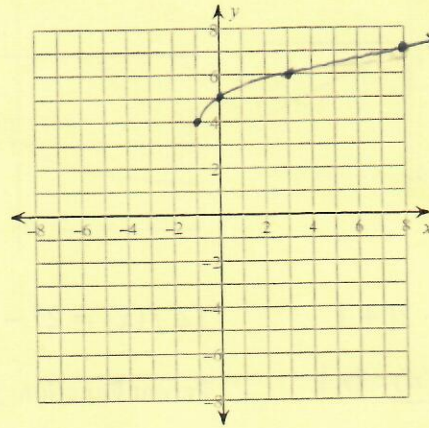
1) $y = -2\sqrt{x+3} + 1$

Dom: $[-3, \infty)$
 Ran: $(-\infty, 1]$



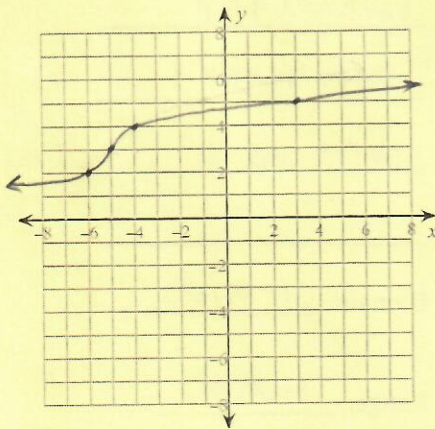
2) $y = \sqrt{x+1} + 4$

Dom: $[-1, \infty)$
 Ran: $[4, \infty)$



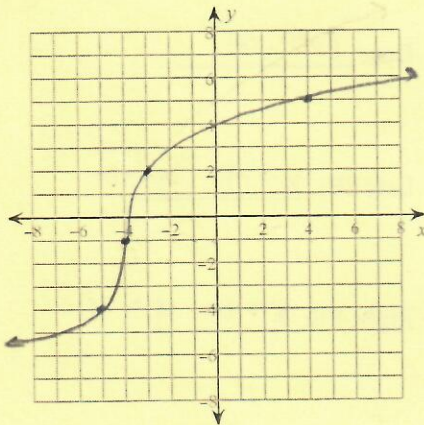
3) $y = \sqrt[3]{x+5} + 3$

Dom: $(-\infty, \infty)$
 Ran: $(-\infty, \infty)$



4) $y = 3\sqrt[3]{x+4} - 1$

Dom: $(-\infty, \infty)$
 Ran: $(-\infty, \infty)$



Solve each equation. Remember to check for extraneous solutions.

$$5) \sqrt{-6-2x} = \sqrt{1-x}$$

$$(\sqrt{-6-2x})^2 = (\sqrt{1-x})^2$$

$$-6-2x = 1-x$$

$$\boxed{-7 = x}$$

Check:

$$\sqrt{-6-2(-7)} = \sqrt{1-(-7)}$$

$$\sqrt{-6+14} = \sqrt{8}$$

$$\sqrt{8} = \sqrt{8} \checkmark$$

$$6) 7 + \sqrt{-10-2m} = 9$$

$$\sqrt{-10-2m} = 2$$

$$-10-2m = 4$$

$$-2m = 14$$

$$\boxed{m = -7}$$

check:

$$7 + \sqrt{-10-2(-7)} = 9$$

$$7 + \sqrt{-10+14} = 9$$

$$7 + \sqrt{4} = 9$$

$$7 + 2 = 9$$

$$9 = 9 \checkmark$$

$$7) \sqrt{5x+51} - x = 3$$

$$\sqrt{5x+51} = x+3$$

$$5x+51 = (x+3)^2$$

$$5x+51 = x^2+6x+9$$

$$0 = x^2+x-42$$

$$\rightarrow 0 = (x+7)(x-6)$$

$$x = -7 \quad \boxed{x = 6}$$

↑
extraneous

$$8) \sqrt{56-7p} = p-8$$

$$56-7p = (p-8)^2$$

$$56-7p = p^2-16p+64$$

$$0 = p^2-9p+8$$

$$0 = (p-8)(p-1)$$

$$\boxed{p = 8} \quad p = 1$$

check:

$$\sqrt{56-7(8)} = (8)-8$$

$$\sqrt{56-56} = 8-8$$

$$0 = 0 \checkmark$$

$$\sqrt{56-7(1)} = (1)-8$$

$$\sqrt{49} = -7$$

$$7 \neq -7$$

So $p = 1$ is extraneous

$$9) \sqrt{45-5b} = b-9$$

$$45-5b = (b-9)^2$$

$$45-5b = b^2-18b+81$$

$$0 = b^2-13b+36$$

$$0 = (b-4)(b-9)$$

$$b = 4 \quad \boxed{b = 9}$$

check:

$$\sqrt{45-5(4)} = (4)-9$$

$$\sqrt{45-20} = 4-9$$

$$\sqrt{25} = -5$$

$$5 \neq -5$$

So $b = 4$ is extraneous

$$\sqrt{45-5(9)} = (9)-9$$

$$\sqrt{45-45} = 0$$

$$0 = 0 \checkmark$$