Are there any Homework Questions you would like to see on the board?

Last day's work:

pp. 202-203 #1 – 12, 13 – 17, 19 – 23

10, 13, 11
14, 16
18
9c d

Today's Homework Practice includes:
Review

p. 204 #1 – 9

p.202

9c) $4\sqrt{12} - 3\sqrt{48}$

$= 4\sqrt{4}\sqrt{3} - 3\sqrt{16}\sqrt{3}$

$= 4(2)\sqrt{3} - 3(4)\sqrt{3}$

$= 8\sqrt{3} - 12\sqrt{3}$

$= -4\sqrt{3}$

d) $(3-2\sqrt{7})^2$

$= 9 - 12\sqrt{7} + 4(7)$

$= 9 - 12\sqrt{7} + 28$

$= 37 - 12\sqrt{7}$

$(3x-2y)^2$

$= 9x^2 - 12xy + 4y^2$

$(-2\sqrt{7})^2$

$(4(7))$

*Recall

$\sqrt{7} \times \sqrt{2}$

$= \sqrt{14}$

$(3\sqrt{2})(4\sqrt{5})$

$= 12\sqrt{10}$

$(2\sqrt{2})(3\sqrt{6})$

$= 6\sqrt{12}$

$= 6\sqrt{4}\sqrt{3}$

$= 6(2)\sqrt{3}$

$= 12\sqrt{3}$

10) $S = \dfrac{a+b+c}{2}$

$= \dfrac{5+7+10}{2}$

$= \dfrac{22}{2}$

$= 11$

5, 7, 10

$A = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{11(11-5)(11-7)(11-10)}$

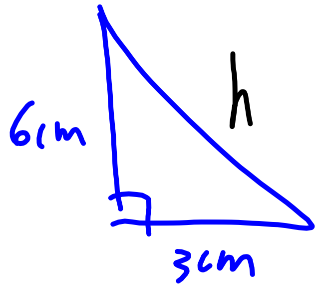
$= \sqrt{11(6)(4)(1)}$

$= \sqrt{264}$

$= \sqrt{4}\sqrt{66}$

$= 2\sqrt{66}$ units^2

p202 #11



$h^2 = 6^2 + 3^2$ (PT)

$= 36 + 9$

$= 45$

$h = \sqrt{45}$

$= \sqrt{9}\sqrt{5}$

$= 3\sqrt{5}$ cm

$P = 6 + 3 + 3\sqrt{5}$

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

13. The population of a Canadian city is modelled by $P(t) = 12t^2 + 800t + 40\ 000$, where t is the time in years. When $t = 0$, the year is 2007.

a) According to the model, what will the population be in 2020?

b) In what year is the population predicted to be 300 000?

$t = 2020 - 2007$

$\therefore t = 13$

a) $P(13) = 12(13)^2 + 800(13) + 40\,000$

b) $300\,000 = 12t^2 + 800t + 40\,000$

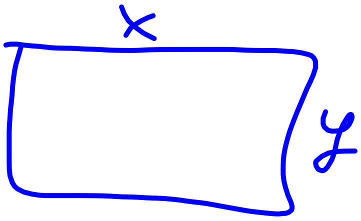
$0 = 12t^2 + 800t + 40\,000 - 300\,000$

$= 12t^2 + 800t - 260\,000$

$= 4(3t^2 + 200t - 65\,000)$

$$t = \frac{-200 \pm \sqrt{200^2 - 4(3)(-65000)}}{2(3)}$$

14. A rectangular field with an area of 8000 m^2 is enclosed by 400 m of fencing. Determine the dimensions of the field to the nearest tenth of a metre.



$2x+2y=400$

$2x=400-2y$

$x=200-y$

$A=xy$

$8000=(200-y)y$

$8000=200y-y^2$

$y^2-200y+8000=0$

$$y=\frac{-(-200)\pm\sqrt{(200^2)-4(1)(8000)}}{2(1)}$$

$$=\frac{200\pm\sqrt{40000-32000}}{2}$$

$$=\frac{200\pm\sqrt{8000}}{2}$$

$y \doteq 144.72 \quad y \doteq 55.27$

$$y^2 - 200y + 8000 = 0$$

$$y^2 - 200y + 10000 - 10000 + 8000 = 0$$

$$(y-100)^2 - 2000 = 0$$

$$\sqrt{(y-100)^2} = \pm\sqrt{2000}$$

$$y - 100 = \pm\sqrt{2000}$$

$$y = 100 \pm \sqrt{2000}$$

$$y = 100 + \sqrt{2000} \quad \text{or} \quad y = 100 - \sqrt{2000}$$

$$\doteq 144.72 \qquad\qquad \doteq 55.27$$

16. Determine the values of k for which the function $f(x) = 4x^2 - 3x + 2kx + 1$ has two zeros. Check these values in the original equation.

$a = 4$

$b = (-3 + 2k)$

$c = 1$

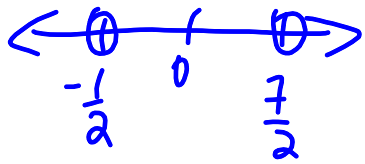
$$b^2 - 4ac > 0$$

$$(-3+2k)^2 - 4(4)(1) > 0$$

$$9 - 12k + 4k^2 - 16 > 0$$

$$4k^2 - 12k - 7 > 0$$

$$(2k+1)(2k-7) > 0$$



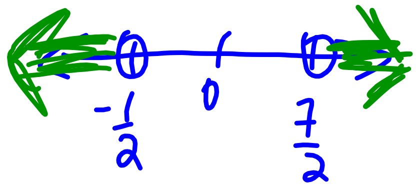
Test $k = 0$

$LS = (2(0)+1)(2(0)-7)$ $\quad RS = 0$

$= (1)(-7)$

$= -7$

$\therefore LS < RS$

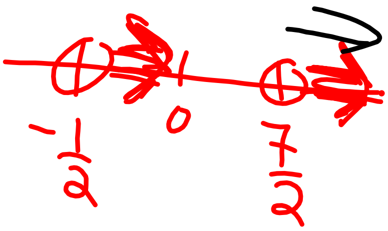


$$\overset{+}{(2k+1)}\overset{+}{(2k-7)} > 0$$

$2k+1 > 0$ $\qquad 2k-7 > 0$

$2k > -1$ $\qquad 2k > 7$

$k > -\frac{1}{2}$ $\qquad k > \frac{7}{2}$

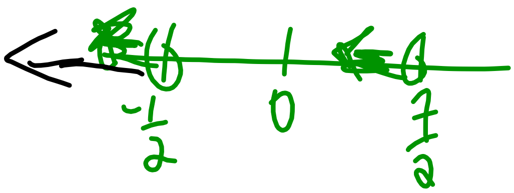


$$\overset{-}{(2k+1)}\overset{-}{(2k-7)} > 0$$

$2k+1 < 0$ $\qquad 2k-7 < 0$

$2k < -1$ $\qquad 2k < 7$

$k < -\frac{1}{2}$ $\qquad k < \frac{7}{2}$



Lesson 3.7

18. Determine the equation of the parabola with roots $2 + \sqrt{3}$ and $2 - \sqrt{3}$, and passing through the point (2, 5).

$$y = a(x-r)(x-s)$$
$$= a(x-(2+\sqrt{3}))(x-(2-\sqrt{3}))$$
$$= a(x^2-(2-\sqrt{3})x-(2+\sqrt{3})x+(2+\sqrt{3})(2-\sqrt{3}))$$
$$= a(x^2-2x+\cancel{\sqrt{3}x}-2x-\cancel{\sqrt{3}x}+4-\cancel{2\sqrt{3}}+\cancel{2\sqrt{3}}-3)$$
$$= a(x^2-4x+1)$$
$$5 = a((2)^2-4(2)+1)$$
$$= a(4-8+1)$$
$$5 = a(-3)$$
$$-\frac{5}{3} = a \qquad \therefore y = -\frac{5}{3}(x^2-4x+1)$$

Lesson 3.7

18. Determine the equation of the parabola with roots $2 + \sqrt{3}$ and $2 - \sqrt{3}$, and passing through the point (2, 5).

$$y = a(x - r)(x - s)$$
$$= a(x - (2+\sqrt{3}))(x - (2-\sqrt{3}))$$
$$5 = a(2 - 2 - \sqrt{3})(2 - 2 + \sqrt{3})$$
$$5 = a(-\sqrt{3})(\sqrt{3})$$
$$5 = a(-3)$$
$$-\frac{5}{3} = a \quad \therefore y = -\frac{5}{3}(x - (2+\sqrt{3}))(x - (2-\sqrt{3}))$$
is the equation.

$$y = -\frac{5}{3}x^2 - \frac{20}{3}x - \frac{5}{3}$$

Quadratics Review

Date: Oct. 23/15

1. For each function below state the direction of the opening, the vertex, axis of symmetry, max or min value, and the domain and range. Finally, sketch the function.

a) $f(x) = -2(x-5)^2 - 4$

Opens down

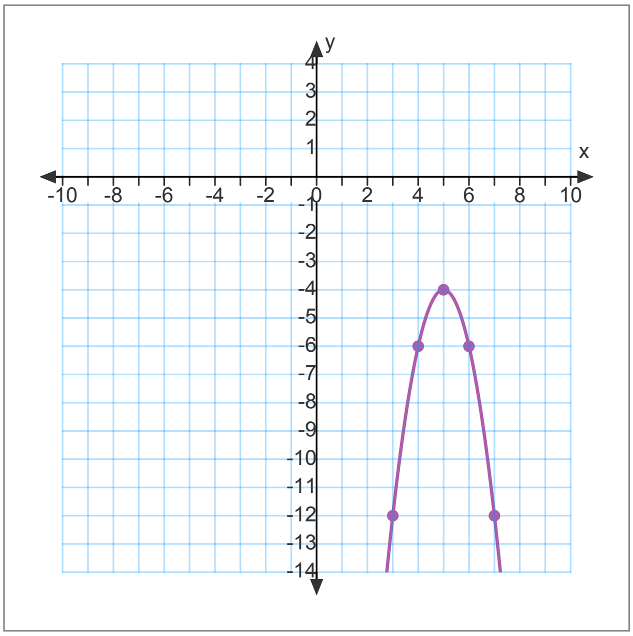
$v(5, -4)$

A of S: $x = 5$

max. value is -4

$D = \{x \in \mathbb{R}\}$

$R = \{y \in \mathbb{R} / y \leq -4\}$



$y = -2(x-5)^2 - 4$

b) $f(x) = 2(x-3)(x+5)$

find zeros: $x = 3$, $x = -5$

A of S: $x = \frac{-5+3}{2}$

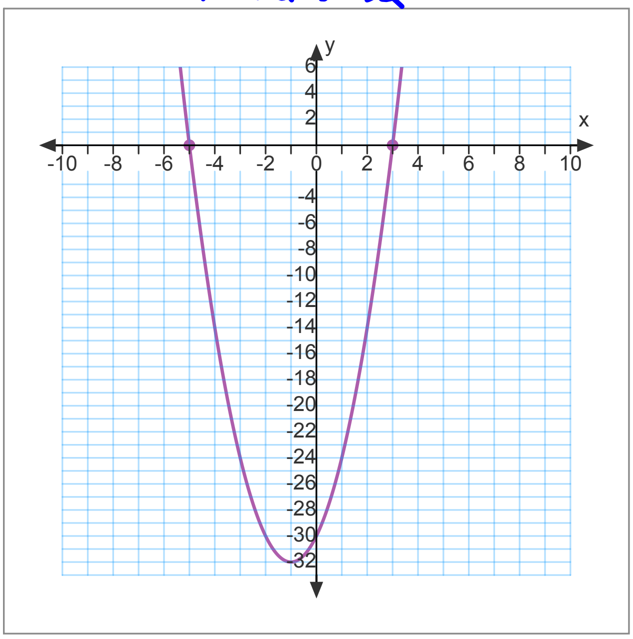
$= -1$

$f(-1) = 2(-1-3)(-1+5)$

$= 2(-4)(4)$

$= -32$ $\quad v(-1, -32)$

$\therefore$ min value is -32



$D = \{x \in \mathbb{R}\}$

$R = \{y \in \mathbb{R} / y \geq -32\}$

$y = 2(x-3)(x+5)$

2. a) The height, $h(t)$, in metres, of the tragectory of a football is given by $h(t)=2+28t-4.9t^2$, where t is the time in flight, in seconds. Determine the maximum height of the football and the time when that height is reached.

$h(t)=-4.9t^2+28t+2$

You could complete the square to find the vertex,

$=-4.9\left(t^2+\frac{28}{-4.9}t\right)+2$

$=-4.9\left(t^2-\frac{40}{7}t+\left(\frac{20}{7}\right)^2-\left(\frac{20}{7}\right)^2\right)+2$

$=-4.9\left(t-\frac{20}{7}\right)^2-4.9\left(\frac{-400}{49}\right)+2$

$=-4.9\left(t-\frac{20}{7}\right)^2+40+2$

$=-4.9\left(t-\frac{20}{7}\right)^2+42$

$\therefore$ the max. height of the ball is 42 m and occurs $\frac{20}{7}$ sec. (or $\doteq 2.86$ sec)

b) How long will it take for the ball to hit the ground?

ball hits ground when $h(t)=0$

$0=-4.9t^2+28t+2$

$t=\frac{-(28)\pm\sqrt{(28)^2-4(-4.9)(2)}}{2(-4.9)}$

$=\frac{-28\pm\sqrt{784+39.2}}{-9.8}$

$=\frac{-28\pm\sqrt{823.2}}{-9.8}$

$t=\frac{-28-\sqrt{823.2}}{-9.8}$ or $t=\frac{-28+\sqrt{823.2}}{-9.8}$

$\doteq 5.784$ $\qquad \doteq -0.070$ inadmissible (<0)

$\therefore$ the football hits the ground at 5.78 sec.

3. a) Determine the inverse of $f(x)=-3(x-4)^2+2$

$x=-3(y-4)^2+2$ $\quad$ V(4,2) $a=-3$

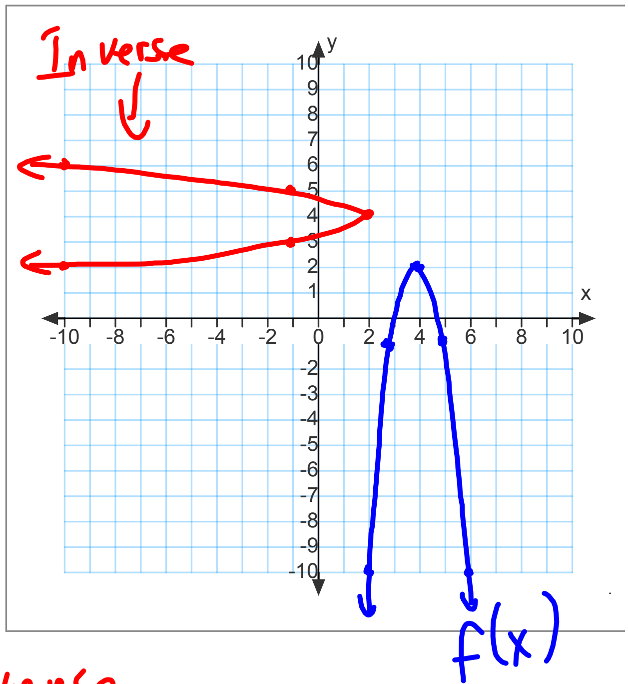
$x-2=-3(y-4)^2$

$\frac{x-2}{-3}=(y-4)^2$

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

$\therefore y=\pm\sqrt{\frac{x-2}{-3}}+4$ is the eq'n of the inverse.

b) Graph $f(x)$ and $f^{-1}(x)$



c) Is the inverse a function? Explain using words.

No. the red graph (Inverse) fails the VLT.

d) State the domain and range of $f(x)$ and $f^{-1}(x)$

f(x)

$D=\{x\in\mathbb{R}\}$

$R=\{y\in\mathbb{R}\mid y\le 2\}$

Inverse

$D=\{x\in\mathbb{R}\mid x\le 2\}$

$R=\{y\in\mathbb{R}\}$

4. Express each radical in simplest radical form.

a) $\sqrt{98}$

$=\sqrt{49}\sqrt{2}$

$=7\sqrt{2}$

b) $-5\sqrt{50}$

$=-5\sqrt{25}\sqrt{2}$

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

$=-25\sqrt{2}$

c) $-2\sqrt{12}+4\sqrt{48}$

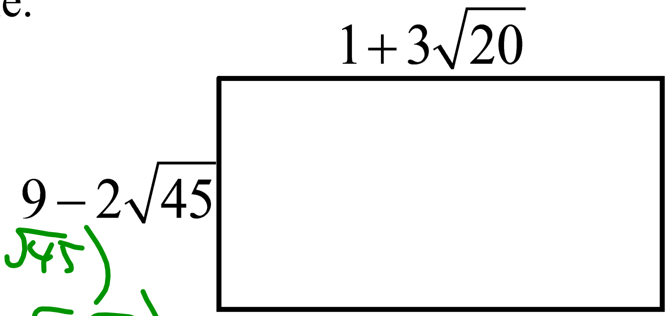
$=-2\sqrt{4}\sqrt{3}+4\sqrt{16}\sqrt{3}$

$=-2(2)\sqrt{3}+4(4)\sqrt{3}$

$=-4\sqrt{3}+16\sqrt{3}$

$=12\sqrt{3}$

5. Determine an expression in lowest terms for the perimeter AND area of the rectangle.



$P=2l+2w$

$=2(1+3\sqrt{20})+2(9-2\sqrt{45})$

$=2(1+3\sqrt{4}\sqrt{5})+2(9-2\sqrt{9}\sqrt{5})$

$=2(1+6\sqrt{5})+2(9-6\sqrt{5})$

$=2+12\sqrt{5}+18-12\sqrt{5}$

$=20$ units

$A=lw$

$=(1+3\sqrt{20})(9-2\sqrt{45})$

$=(1+6\sqrt{5})(9-6\sqrt{5})$

$=9-6\sqrt{5}+54\sqrt{5}-36(5)$

$=9+48\sqrt{5}-180$

$=-171+48\sqrt{5}$ units^2

6. a) The height, $h(t)$, of a projectile, in metres, can be modelled by the equation $h(t) = 14t - 5t^2$, where t is the time in seconds after the projectile is released. Can the projectile ever reach a height of 9 m? Let $h(t)=9$

$$9 = 14t - 5t^2$$
$$0 = -5t^2 - 14t + 9$$

use $b^2 - 4ac$

$$= (-14)^2 - 4(-5)(9)$$
$$= 196 + 180$$
$$= 376$$

$\therefore b^2 - 4ac > 0 \therefore$ there are 2 solutions with height 9 m.

b) How long will it take for it to hit the ground?

$$h(t) = 14t - 5t^2$$
$$= -5t^2 + 14t$$
$$= -5t\left(t - \frac{14}{5}\right)$$

$\therefore t = 0$ (before being projected) or $t = \frac{14}{5}$

$$= 2.8$$

$\therefore$ hits ground at 2.8 sec.

or use quadratic formula:
a= -5, b = 14, c = 0

7. Determine the value(s) for k for which the function has no roots.

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

Let $b^2 - 4ac < 0$

$(-4)^2 - 4(3)(k) < 0$

$16 - 12k < 0$

$-12k < -16$

$\frac{-12k}{-12} > \frac{-16}{-12}$

$k > \frac{4}{3}$

8. Determine the equation of parabola that has roots $\sqrt{5}$ and $-\sqrt{5}$ and goes through point (-1, 6).

$y = a(x-\sqrt{5})(x+\sqrt{5})$

$= a(x^2-5)$

$6 = a((-1)^2-5)$

$= a(1-5)$

$6 = -4a$

$\cancel{\frac{-3}{2} = a}$

$\therefore y = \frac{-3}{2}(x^2-5)$ is the equation.

or

$6 = a((-1)-\sqrt{5})((-1)+\sqrt{5})$

$6 = a(1-\sqrt{5}+\sqrt{5}-\sqrt{25})$

$6 = a(1-5)$

$6 = a(-4)$

$-\frac{6}{4} = a$

$\therefore a = \frac{-3}{2}$

$\therefore y = \frac{-3}{2}(x-\sqrt{5})(x+\sqrt{5})$ is the equation

$\leftarrow$ Same $\rightarrow$

9. Solve $3x^2 - 4x + 2 = 0$

$a=3 \quad b=-4 \quad c=2$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(2)}}{2(3)}$$

$$= \frac{4 \pm \sqrt{16-24}}{6}$$

$$= \frac{4 \pm \sqrt{-8}}{6}$$

$\therefore$ No Real Solutions / Roots