11.4 cont'd p. 699

ex 56

$$(x-4)^2 + (x-4) - 20 = 0$$

Let $u = x-4$ → $x-4=-5$, $x-4=4$

$x=-1$ $x=8$

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

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

$u+5=0$ $u-4=0$

$u=-5$ $u=4$

ex 60

$$x^{\frac{2}{3}} - 2x^{\frac{1}{3}} - 3 = 0$$

Let $u = x^{1/3}$, then $u^2 = x^{2/3}$

$u^2 - 2u - 3 = 0$ $x^{1/3} = 3$, $x^{1/3} = -1$

$(u-3)(u+1)=0$ $\sqrt[3]{x} = 3$, $\sqrt[3]{x} = -1$

$u-3=0$, $u+1=0$ $x = 3^3$ $x = (-1)^3$

$u=3$, $u=-1$ $x=27$ $x=-1$

Check $x^{\frac{2}{3}} - 2x^{\frac{1}{3}} - 3 = 0$

$$\left(\sqrt[3]{27}\right)^2 - 2\sqrt[3]{27} - 3 \stackrel{?}{=} 0$$

$$9 - 2\cdot 3 - 3 \stackrel{?}{=} 0 \checkmark$$

$$\left(\sqrt[3]{-1}\right)^2 - 2\sqrt[3]{-1} - 3 \stackrel{?}{=} 0$$

$$1 - 2(-1) - 3 \stackrel{?}{=} 0 \checkmark$$

ex 64 $9t^{\frac{4}{3}} - 25t^{2/3} + 16 = 0$

$u = t^{2/3}$, then $u^2 = t^{4/3}$

$9u^2 - 25u + 16 = 0$

$u = \dfrac{-B \pm \sqrt{B^2 - 4AC}}{2A}$

$= \dfrac{25 \pm \sqrt{625 - 576}}{18}$

$= \dfrac{25 \pm \sqrt{49}}{18} = \dfrac{25 \pm 7}{18}$

$u = \dfrac{25+7}{18}$, $u = \dfrac{25-7}{18}$

$\dfrac{32}{18} = \dfrac{16}{9}$ $= \dfrac{18}{18}$ $= 1$

$t^{2/3} = \dfrac{16}{9}$, $t^{2/3} = 1$

$\sqrt[3]{t^2} = \dfrac{16}{9}$, $\sqrt[3]{t^2} = 1$

$t^2 = \dfrac{4096}{729}$ $t^2 = 1^3$

$t^2 = 1$

$t = \pm\dfrac{64}{27}$ $t = \pm 1$

ex 68

$3 - 2(x-1)^{-1} = (x-1)^{-2}$

$(x-1)^{-1} = u$ & $u^2 = (x-1)^{-2}$

$3 - 2u = u^2$
$-3 \quad +2u \quad -3 \quad +2u$

$0 = u^2 + 2u - 3$

$(u+3)(u-1) = 0$

$u + 3 = 0$ $u - 1 = 0$
$u = -3$ $u = 1$

$(x-1)^{-1} = -3$, $(x-1)^{-1} = 1$

$(x-1)\dfrac{1}{x-1} = -\dfrac{3}{1}(x-1)$

$1 = -3x + 3$
$-2 = -3x$
$\dfrac{2}{3} = x$

$\dfrac{1}{x-1} = 1$
$x - 1 = 1$
$x = 2$

11.5 p. 705

ex 8 $S = 6e^2$, solve for e

$$\frac{S}{6} = \frac{6e^2}{6}$$

$$\sqrt{\frac{S}{6}} = \sqrt{e^2}$$

$$\pm\sqrt{\frac{S}{6}} = e$$

$$e = \pm\frac{\sqrt{S}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$$

$$e = \pm\frac{\sqrt{6S}}{6}$$

ex 14 $V = \pi(r^2 + R^2)h$ solve for r

$$\frac{V}{\pi h} = \frac{\cancel{\pi}(r^2 + R^2)\cancel{h}}{\cancel{\pi}\cancel{h}}$$

$$\frac{V}{\pi h} = r^2 + R^2$$

$$-R^2 \qquad -R^2$$

$$\sqrt{\frac{V}{\pi h} - \frac{R^2}{1}} = \sqrt{r^2}$$

$$r = \pm\sqrt{\frac{V}{\pi h} - \frac{R^2\pi h}{\pi h}}$$

$$r = \pm\sqrt{\frac{V - R^2\pi h}{\pi h}} \cdot \frac{\sqrt{\pi h}}{\sqrt{\pi h}}$$

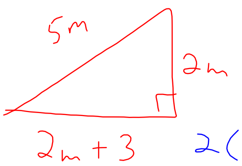
$$r = \pm\frac{\sqrt{V\pi h - R^2\pi^2 h^2}}{\pi h}$$

ex 20 $p^2 = \left(\sqrt{\frac{k\ell}{g}}\right)^2$ solve for g

$$g \cdot p^2 = \frac{k\ell}{\cancel{g}} \cdot \cancel{g}$$

$$\frac{g\cancel{p^2}}{\cancel{p^2}} = \frac{k\ell}{p^2} \longrightarrow g = \frac{k\ell}{p^2}$$

ex 30



$5(1.16) = 5.8$

$2(1.2) = 2.4$

$2(1.16) = 2.32 = 2.3$

$a^2 + b^2 = c^2$

$2(1.16) + 3 = 5.3$

$$(2m)^2 + (2m+3)^2 = (5m)^2$$

$$4m^2 + 4m^2 + 12m + 9 = 25m^2$$
$$-25m^2 \qquad\qquad -25m^2$$

$$-17m^2 + 12m + 9 = 0$$

$$m = \frac{-12 \pm \sqrt{144 + 612}}{-34}$$

$$= \frac{-12 \pm \sqrt{756}}{-34}$$

$$= \frac{-12 \pm 27.495}{-34}$$

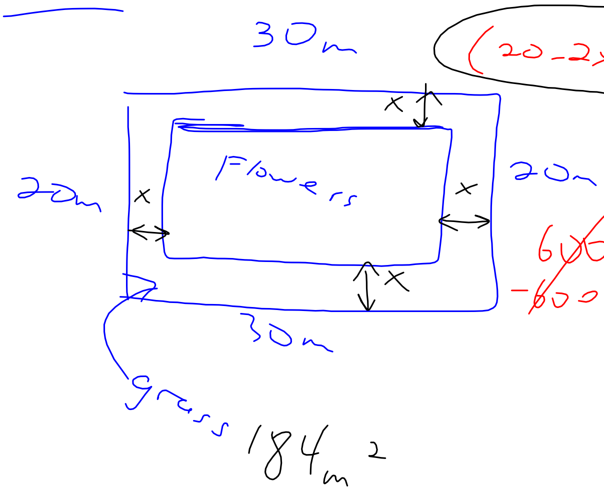
$$\frac{-12 + 27.495}{-34} = -.5$$

no neg. dist!

$$\frac{-12 - 27.495}{-34} = \cancel{1.2}$$

1.16

ex40



Flowers + grass = yard

$$(20-2x)(30-2x) + 184 = 20 \cdot 30$$

$$\cancel{600} - 100x + 4x^2 + 184 = \cancel{600}$$

$$-\cancel{600} \qquad\qquad -\cancel{600}$$

$$\frac{4x^2}{4} - \frac{100x}{4} + \frac{184}{4} = \frac{0}{4}$$

$$x^2 - 25x + 46 = 0$$

$$(x-23)(x-2) = 0$$

$$x = \cancel{23} \text{ or } x = 2$$

$20 - 2x$

$20 - 4 = 16'$

$30 - 2x$

$30 - 4$

26

ex49 #50 t = seconds $s(t)$ height (feet)

$$s(t) = -16t^2 + 160t$$

ex49 $\rightarrow$ $400 = -16t^2 + 160t$

$$-400 \qquad\qquad -400$$

$$\frac{0}{-16} = \frac{-16t^2}{-16} + \frac{160t}{-16} - \frac{400}{-16}$$

$$0 = t^2 - 10t + 25$$

$$(t-5)(t-5) = 0$$

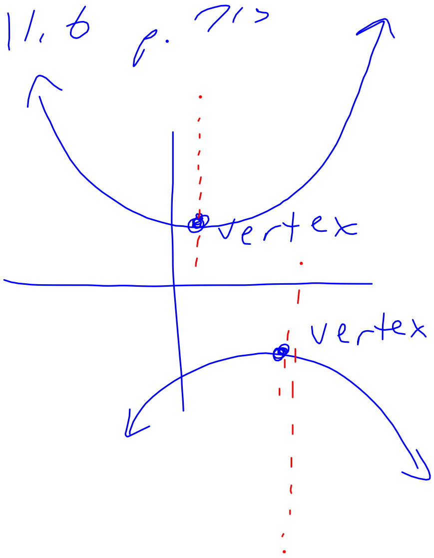
$t = 5$ seconds

$$425 = -16t^2 + 160t$$

$$-16t^2 + 160t - 425 = 0$$

$$t = \frac{-160 \pm \sqrt{\overset{25600}{160^2} - 4(-16)(-425)}}{-32} \quad -27200$$

11.6 p. 715



ex4 $f(x) = \frac{1}{2}x^2 + 0x + 0$

$x = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$

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

Vertex $(0, \underline{0})$

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

ex6 $f(x) = x^2 - 4$

$A = 1 \quad B = 0 \quad C = -4$

$x = \frac{-B}{2A} = \frac{-0}{2(1)} = 0$

Vertex $(0, \underline{-4})$

$f(0) = 0^2 - 4$

$$f(x) = a(x-h)^2 + k$$

$$V(h, k)$$

ex 8

$$f(x) = (x+3)^2 + 0$$

$$V(-3, 0)$$

ex 11

$$f(x) = -(x-5)^2 + 6$$

$$V(5, 6)$$