Talk about Quadratics

§1.6

$ax^2+bx+c=0 \Rightarrow x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

Solving Techniques:

1. Completing the square
2. Factoring – when you can, do.
3. Quadratic Formula – you can "cheat"

"Solve by Factoring" questions with it

$(6x-3)(5x+14)$

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37

§1.6 #85, 107, 93 (94)

$12x^2+\sqrt{6}x-1=0$

$a=12,\ b=\sqrt{6},\ c=-1$

b^2-4ac = discriminant

$(\sqrt{6})^2+4(12)(1)=6+48=54$

$x=\frac{-\sqrt{6}\pm 3\sqrt{6}}{2(12)}=\frac{-\sqrt{6}\pm 3\sqrt{6}}{24}$

$54 = 2\cdot 3\cdot 3\cdot 3$

$\sqrt{2\cdot 3\cdot 3\cdot 3} = 3\sqrt{2\cdot 3} = 3\sqrt{6}$

(94) $\frac{x-9}{x-2} = -\frac{x+3}{x+1} = \frac{-(x+3)}{x+1}$ LCD $= (x-2)(x+1)$

$\left(\frac{x-9}{x-2}\right)\left(\frac{x+1}{x+1}\right) = \left(\frac{-(x+3)}{x+1}\right)\left(\frac{x-2}{x-2}\right)$ $\frac{A}{B} = \frac{C}{B} \Rightarrow$ $A = C$

$\frac{(x-9)(x+1)}{LCD} = \frac{-(x+3)(x-2)}{LCD}$

$x^2 - 8x - 9 = -(x^2 + x - 6) = -x^2 - x + 6$

$+x^2 + x - 6$ $+x^2 + x - 6$

$2x^2 - 7x - 15 = 0$

$a = 2, b = -7, c = -15$

$b^2 - 4ac = (-7)^2 - 4(2)(-15)$

$= 49 + 120$

$= 169 = 13^2$ is perfect square, so it DOES factor (over the rational numbers)

Factors of -30 whose sum is -7

$(-10)(3) = -30$

$-10 + 3 = -7$

$2x^2 - 10x + 3x - 15 = 0$

$2x(x-5) + 3(x-5) = 0$

$(x-5)(2x+3) = 0$

$\Rightarrow x = 5$ OR $x = -\frac{3}{2}$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \frac{7 \pm \sqrt{169}}{2(2)} = \frac{7 \pm 13}{4}$

$x = \frac{20}{4} = 5$, $-\frac{3}{2} = x$

$2x^2 - 7x - 15 = 0$

FACTOR THEOREM SAYS

$2(x-5)(x-(-\frac{3}{2})) = 0$

$2(x-5)(x+\frac{3}{2}) = 0$

$(x-5)(2)(x+\frac{3}{2}) = 0$

$(x-5)(2x+3) = 0$

If $x = c$ is a zero, then $(x-c)$ is a factor.

Sep 7-10:25 AM

s = Height of body in free fall under gravity's acceleration, g, is given by

$$s = -\frac{1}{2}gt^2 + v_0 t + s_0$$

$$= -16t^2 + v_0 t + s_0 \quad \text{('murrican)}$$

$$= -4.9t^2 + v_0 t + s_0, \text{ where} \quad \text{(metric)}$$

v_0 = initial velocity (up is positive) $= 40\frac{ft}{s}$

s_0 = " height. $= 4\,ft$

$s_0 = 4$. when does $s = s(t) = 4$ again?

$s(t) = -16t^2 + 40t + 4 \overset{\text{SET}}{=} 4$ & solve.

Find distance between, midpoint of, and equation of the line thru $P(\pi, 1)$ & $Q\left(\frac{\pi}{4}, \frac{\sqrt{2}}{2}\right)$

$$d(P,Q) = \sqrt{(x_1-x_2)^2 + (y_1-y_2)^2} = \sqrt{\left(\pi - \frac{\pi}{4}\right)^2 + \left(1 - \frac{\sqrt{2}}{2}\right)^2}$$

$$= \sqrt{\left(\frac{3\pi}{4}\right)^2 + \left(\frac{2-\sqrt{2}}{2}\right)^2}$$

$$\pi - \frac{\pi}{4} = \frac{4\pi}{4} - \frac{\pi}{4} = \frac{3\pi}{4}$$

$$mid(P,Q) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{\pi + \frac{\pi}{4}}{2}, \frac{1+\frac{\sqrt{2}}{2}}{2}\right)$$

$$= \left(\frac{\frac{5\pi}{4}}{2}, \frac{\frac{2+\sqrt{2}}{2}}{2}\right) = \left(\frac{5\pi}{8}, \frac{2+\sqrt{2}}{4}\right)$$

Eq'n of line between them:

$P(\pi, 1)$ & $Q\left(\frac{\pi}{4}, \frac{\sqrt{2}}{2}\right)$

$$m = \frac{y_2-y_1}{x_2-x_1} = \frac{\frac{\sqrt{2}}{2} - 1}{\frac{\pi}{4} - \pi} = \frac{\frac{\sqrt{2}-2}{2}}{\frac{-3\pi}{4}}$$

$$= \frac{\sqrt{2}-2}{2} \cdot \left(-\frac{4}{3\pi}\right) = \frac{(\sqrt{2}-2)(-2)}{3\pi} = \frac{4-2\sqrt{2}}{3\pi}$$

$$y = m(x - x_1) + y_1$$

$$\boxed{y = \frac{4-2\sqrt{2}}{3\pi}\left(x - \pi\right) + 1}$$

Find line parallel to it, thru $(2, 38\sqrt{5})$

$$y = \frac{4-2\sqrt{2}}{3\pi}(x-2) + 38\sqrt{5}$$

Find line perpendicular to it, thru $(e, \frac{\pi}{\sqrt{2}})$

$$y = \frac{-3\pi}{4-2\sqrt{2}}(x-e) + \frac{\pi}{\sqrt{2}}$$