§8.2

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

See pp 489-90

Assume $a > 0$

$$ax^2 + bx + c = 0$$

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

$$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = -\frac{c}{a} + \frac{b^2}{4a^2}$$

$$\frac{\frac{b}{a}}{2} = \frac{b}{a}\cdot\frac{1}{2} = \frac{b}{2a} \longrightarrow \left(\frac{b}{2a}\right)^2 = \frac{b^2}{(2a)^2} = \frac{b^2}{2^2a^2} = \frac{b^2}{4a^2}$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2-4ac}{4a^2}$$

$$LCD = 2\cdot 2\cdot a^2$$

$$-\frac{c}{a} + \frac{b^2}{4a^2} =$$

$$-\frac{c}{a}\cdot\frac{4a}{4a} + \frac{b^2}{4a^2} = \frac{-4ac}{4a^2} + \frac{b^2}{4a^2} = \frac{b^2-4ac}{4a^2}$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2-4ac}{4a^2}$$

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

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

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

$$\sqrt{4a^2} =$$

$$\sqrt{4}\sqrt{a^2} =$$

$$2a$$

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

Assume $a > 0$.

$2x^2 + 9x + 10 = 0$

$a = 2, b = 9, c = 10$

$b^2 - 4ac = 9^2 - 4(2)(10)$

$= 81 - 80 = 1$

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

$= \frac{-9 \pm \sqrt{1}}{2(2)} = \frac{-9 \pm 1}{4}$

$\frac{-9+1}{4} = \frac{-8}{4} = -2$

$\frac{-9-1}{4} = \frac{-10}{4} = -\frac{5}{2}$

$2x^2 + 5x + 4x + 10 = 0$

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

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

$x \in \{-\frac{5}{2}, -2\}$

$2x^2+7x+5=0$

Factoring:

$2x^2+5x+2x+5=0$

$x(2x+5)+1(2x+5)=0$

$(2x+5)(x+1)=0$

$\left\{-\frac{5}{2}, -1\right\}$

Completing Square:

$x^2+\frac{7}{2}x+\frac{5}{2}=0$

$x^2+\frac{7}{2}x+\left(\frac{7}{4}\right)^2=-\frac{5}{2}+\frac{49}{16}$

$\frac{\frac{7}{2}}{2}=\frac{7}{2}\cdot\frac{1}{2}=\frac{7}{4} \rightarrow \left(\frac{7}{4}\right)^2=\frac{49}{16}$

$-\frac{5}{2}\cdot\frac{8}{8}+\frac{49}{16}=\frac{-40+49}{16}=\frac{9}{16}$

Ladies

$\left(x+\frac{7}{4}\right)^2=\frac{9}{16}$

$x+\frac{7}{4}=\pm\sqrt{\frac{9}{16}}=\pm\frac{3}{4}$

$x=-\frac{7}{4}\pm\frac{3}{4}$

$=\frac{-7\pm3}{4}$

$\frac{-7+3}{4}=-1$

$\frac{-7-3}{4}=-\frac{5}{2}$

$2x^2+7x+5=0$

$a=2, b=7, c=5$

$b^2-4ac = 7^2-4(2)(5)$

$=49-40$

$=9$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a} = \frac{-7\pm\sqrt{9}}{2(2)} = \frac{-7\pm3}{4}$

$x\in\{-\frac{5}{2}, -1\}$ as before. very.

$(x-(-\frac{5}{2}))(x-(-1)) = (x+\frac{5}{2})(x+1)$

$= x^2+x+\frac{5}{2}x+\frac{5}{2}$

$= x^2+\frac{7}{2}x+\frac{5}{2}$

Missing the factor of 2

$2(x+\frac{5}{2})(x+1) = (2x+5)(x+1)$

Using the quadratic formula to factor.

$x^2+5x+6=0$ A little work tells you $x=-2$ & $x=-3$. This means

$(x+2)(x+3)$

$(x-(-2))(x-(-3))$

From Factor Theorem, Chapters 5 & 6.

$x^2-x-6=0$

$a=1,\ b=-1,\ c=-6$

$b^2-4ac=(-1)^2-4(1)(-6)$

$=1+24$

$=25$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-(-1)\pm\sqrt{25}}{2(1)}=\frac{1\pm5}{2}$

$\frac{1+5}{2}=3$ $\frac{1-5}{2}=\frac{-4}{2}=-2$

Factors into:

$(x-3)(x-(-2))$

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

FACTOR:

$40x^2 - 34x - 63$

$a = 40,\ b = -34,\ c = -63$

$b^2 - 4ac = (-34)^2 - 4(40)(-63)$

$= 11236$

$\sqrt{11236} = 106$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-(-34) \pm 106}{2(40)} = \frac{34 \pm 106}{80}$

$\frac{34+106}{80} = \frac{140}{80} = \frac{14}{8} = \frac{7}{4}$

$\frac{34-106}{80} = -\frac{72}{80} = -\frac{9}{10}$

$40\left(x - \frac{7}{4}\right)\left(x + \frac{9}{10}\right) =$

Nick Steve

$4 \cdot 10\left(x - \frac{7}{4}\right)\left(x + \frac{9}{10}\right) =$

$4\left(x - \frac{7}{4}\right)10\left(x + \frac{9}{10}\right) =$

$(4x - 7)(10x + 9)$

$\frac{-2 \pm \sqrt{-7}}{5}$ 2 nonreal solutions $b^2-4ac < 0$

$\frac{-2 \pm \sqrt{7}}{5}$ 2 real solutions $b^2-4ac > 0$

$\frac{-2 \pm \sqrt{0}}{5}$ 1 real $b^2-4ac = 0$

Discriminant $= b^2-4ac$

Find an equation with solutions

$\frac{-5 \pm \sqrt{37}}{2}$

$\left(x-\left(\frac{-5+\sqrt{37}}{2}\right)\right)\left(x-\left(\frac{-5-\sqrt{37}}{2}\right)\right)=0$

Lindsey

$x^2-\left(\frac{-5-\sqrt{37}}{2}\right)x-\left(\frac{-5+\sqrt{37}}{2}\right)x+\left(\frac{-5+\sqrt{37}}{2}\right)\left(\frac{-5-\sqrt{37}}{2}\right)$

$= x^2-\left(\frac{-5}{2}x\right)-\left(\frac{-5}{2}\right)x+\frac{(5^2)-37}{4}$

$= x^2+\frac{5}{2}x+\frac{5}{2}x+\frac{25-37}{4}$

$= x^2+5x-\frac{12}{4}$

$= x^2+5x-3$

$x^2+5x-3=0$

S'8.2 #s 4th 1-21, 23, 25, 27, 29, 33, 35, 51

Tuesday