

099 Homework 7 §8.1, 8.2

① Complete the square method

$$\begin{aligned} \textcircled{a} \quad x^2 - 2x - 2 &= 0 \\ x^2 - 2x &= 2 \\ x^2 - 2x + 1^2 &= 2 + 1^2 \\ (x-1)^2 &= 3 \\ x-1 &= \pm\sqrt{3} \\ \boxed{x = 1 \pm \sqrt{3}} \end{aligned}$$

$$\begin{aligned} \textcircled{b} \quad x^2 + 3x - 2 &= 0 \\ x^2 + 3x &= 2 \\ x^2 + 3x + \left(\frac{3}{2}\right)^2 &= 2 + \frac{9}{4} \\ \left(x + \frac{3}{2}\right)^2 &= \frac{17}{4} \\ x + \frac{3}{2} &= \pm\sqrt{\frac{17}{4}} = \pm\frac{\sqrt{17}}{2} \\ \boxed{x = -\frac{3}{2} \pm \frac{\sqrt{17}}{2}} \end{aligned}$$

$$\begin{aligned} \textcircled{c} \quad x^2 + 4x + 6 &= 0 \\ x^2 + 4x &= -6 \\ x^2 + 4x + 2^2 &= -6 + 4 \\ (x+2)^2 &= -2 \\ x+2 &= \pm\sqrt{-2} = \pm i\sqrt{2} \\ \boxed{x = -2 \pm i\sqrt{2}} \end{aligned}$$

$$\begin{aligned} \textcircled{d} \quad 3x^2 - 4x - 4 &= 0 \\ 3\left(x^2 - \frac{4}{3}x - \frac{4}{3}\right) &= 0 \\ x^2 - \frac{4}{3}x - \frac{4}{3} &= 0 \\ x^2 - \frac{4}{3}x &= \frac{4}{3} \\ x^2 - \frac{4}{3}x + \left(\frac{2}{3}\right)^2 &= \frac{4}{3} + \frac{4}{9} \\ \left(x - \frac{2}{3}\right)^2 &= \frac{16}{9} \\ x - \frac{2}{3} &= \pm\sqrt{\frac{16}{9}} = \pm\frac{4}{3} \\ x &= \frac{2}{3} \pm \frac{4}{3} \implies \\ \boxed{x = 2 \text{ OR } x = -\frac{2}{3}} \end{aligned}$$

099

HOMEWORK 7

§8.1, 8.2

(2) Use the quadratic formula, via the discriminant

(a) $x^2 - 12 = -11x$

$$x^2 + 11x - 12 = 0$$

$$a=1, b=11, c=-12$$

$$b^2 - 4ac = 11^2 - 4(1)(-12)$$

$$= 121 + 48$$

$$= 169 = 13^2$$

2 real (and rational!)
solns

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

$$= \frac{-11 \pm \sqrt{169}}{2(1)}$$

$$= \frac{-11 \pm 13}{2}$$

$$x = 1 \text{ OR } x = -12$$

(b) $x(x+6) = 2$

$$x^2 + 6x = 2$$

$$x^2 + 6x - 2 = 0$$

$$a=1, b=6, c=-2$$

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

$$= 36 + 8$$

$$= 44$$

2 real solns

$$x = \frac{-6 \pm \sqrt{44}}{2(1)} = \frac{-6 \pm 2\sqrt{11}}{2}$$

$$x = -3 \pm \sqrt{11}$$

(c) $3x^2 + 7x + 5 = 0$

$$a=3, b=7, c=5$$

$$b^2 - 4ac = 7^2 - 4(3)(5)$$

$$= 49 - 60$$

$$= -11 \Rightarrow$$

2 nonreal solns

$$x = \frac{-7 \pm \sqrt{-11}}{2(3)}$$

$$x = \frac{-7 \pm i\sqrt{11}}{6}$$

099 Homework 7 § 8.1, 8.2

(d) $3x^2 + 7x - 5 = 0$

$a=3, b=7, c=-5$

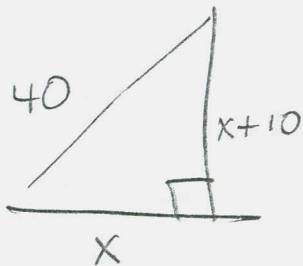
$b^2 - 4ac = 7^2 - 4(3)(-5)$
 $= 49 + 60$

$= 109$ 2 real solns

$x = \frac{-7 \pm \sqrt{109}}{2(3)}$

$x = \frac{-7 \pm \sqrt{109}}{6}$

(3)



Find distance saved by cutting the corner.

$x^2 + (x+10)^2 = 40^2$

$x^2 + x^2 + 20x + 100 = 1600$

$2x^2 + 20x - 1500 = 0$

$x^2 + 10x - 750 = 0$

$a=1, b=10, c=-750$

$b^2 - 4ac = 10^2 - 4(1)(-750)$
 $= 3100$

$x = \frac{-10 \pm \sqrt{3100}}{2(1)}$

$x = \frac{-10 + \sqrt{3100}}{2} \approx$

$\frac{-10 + 10\sqrt{31}}{2} = -5 + 5\sqrt{31}$
 $\rightarrow x \approx 22.83882181$

So, $x + x + 10$ is the long way

≈ 55.67764363

and the distance saved

is the difference

$55.7 - 40 \approx 16$ feet