

Polynomial Review #2 (back page)

$$\begin{array}{r|rrrr} \textcircled{1} & -1 & & & & & & \\ & & 1 & 2 & -5 & -6 & & \\ & & & -1 & -1 & 6 & & \\ \hline & & 1 & 1 & -6 & 0 & & \end{array}$$

Yes it is a factor because remainder = 0.

$$\begin{array}{r|rrrrr} \textcircled{2} & -2 & & & & & & \\ & & 1 & -1 & -11 & 9 & 18 & \\ & & & -2 & 6 & 10 & -38 & \\ \hline & & 1 & -3 & -5 & 19 & -20 & \end{array}$$

No it is not a factor because remainder does not equal 0.

$$\begin{array}{r|rrrrr} \textcircled{3} & 2 & & & & & & \\ & & 4 & -4 & -9 & 1 & 2 & \\ & & & 8 & 8 & -2 & -2 & \\ \hline & & 4 & 4 & -1 & -1 & 0 & \end{array}$$

$$\begin{aligned} (4x^3 + 4x^2)(-1x - 1) &= \\ 4x^2(x+1) - 1(x+1) &= \\ (4x^2 - 1)(x+1) &= \end{aligned}$$

$$\text{Factors} = (x-2)(2x-1)(2x+1)(x+1)$$

$$\begin{array}{r|rrrr} \textcircled{4} & 4 & & & & & & \\ & & 1 & 0 & 0 & -64 & & \\ & & & 4 & 16 & 64 & & \\ \hline & & 1 & 4 & 16 & 0 & & \end{array}$$

$$\begin{aligned} x^2 + 4x + 16 &= 0 \\ \frac{-4 \pm \sqrt{4^2 - 4(1)(16)}}{2(1)} &= \frac{-4 \pm \sqrt{16 - 64}}{2} \\ &= \frac{-4 \pm \sqrt{-48}}{2} = \frac{-4 \pm 4i\sqrt{3}}{2} \\ &= -2 \pm 2i\sqrt{3} \end{aligned}$$

All roots: $4, -2 + 2i\sqrt{3}, -2 - 2i\sqrt{3}$

$$\begin{array}{r|rrrrr} 5 & -3 & 1 & 1 & -2 & 4 & -24 \\ & & -3 & 6 & -12 & 24 & \\ \hline & & 1 & -2 & 4 & -8 & 0 \end{array}$$

Zeros: $-3, 2, 2i, -2i$

$$\begin{aligned} (X^3 - 2X^2 + 4X - 8) &= 0 \\ X^2(X-2) + 4(X-2) &= 0 \\ (X^2 + 4)(X-2) &= 0 \\ X^2 + 4 = 0 & \quad X - 2 = 0 \\ X^2 = -4 & \quad X = 2 \\ X = \pm 2i & \end{aligned}$$

$$\textcircled{6} \quad A(x) = x^4 - x^3 + 7x^2 - 9x - 18 \quad -1, 2$$

$$\begin{array}{r|rrrrr} -1 & 1 & -1 & 7 & -9 & -18 \\ & & -1 & 2 & -9 & 18 \\ \hline & & 1 & -2 & 9 & -18 & 0 \end{array}$$

Zeros: $-1, 2, 3i, -3i$

$$\begin{array}{r|rrrr} 2 & 1 & -2 & 9 & -18 \\ & & 2 & 0 & 18 \\ \hline & & 1 & 0 & 9 & 0 \end{array}$$

$$\begin{aligned} X^2 + 9 &= 0 \\ X^2 &= -9 \\ X &= \pm 3i \end{aligned}$$

$$\textcircled{7} \quad A(x) = x^3 + x^2 - 29x - 5$$

$$\begin{array}{r|rrrr} 5 & 1 & 1 & -29 & -5 \\ & & 5 & 30 & 5 \\ \hline & & 1 & 6 & 1 & 0 \end{array}$$

$$X^2 + 6X + 1 = 0$$

$$\frac{-6 \pm \sqrt{(6)^2 - 4(1)(1)}}{2(1)} =$$

$$\frac{-6 \pm \sqrt{36 - 4}}{2} = \frac{-6 \pm \sqrt{32}}{2}$$

$$= \frac{-6 \pm 4\sqrt{2}}{2} = -3 \pm 2\sqrt{2}$$

Roots:

$$5, -3 + 2\sqrt{2}, -3 - 2\sqrt{2}$$

8a) $0, 3, -5$

b) 4

c) It is a double root.