MORE PRACTICE – More About Zeros of Polynomials

Use the Remainder theorem or long division to determine which numbers are zeros of the given polynomial.

1. $x^3 + 7x^2 - 36$; 1, 2, 3

$(-1)^3 + 7(-1)^2 - 36 = -30$ No

$(-2)^3 + 7(-2)^2 - 36 = -16$ No

$(-3)^3 + 7(-3)^2 - 36 = 0$ Yes

2. $x^3 - 2x^2 - 5x + 6$; 1, 2, 3

$(-1)^3 - 2(-1)^2 - 5(-1) + 6 = 8$ No

$(-2)^3 - 2(-2)^2 - 5(-2) + 6 = 0$ Yes

$(-3)^3 - 2(-3)^2 - 5(-3) + 6 = -24$ No

What is the remainder of the division problem:

4. $\dfrac{x^3+4x^2-3x-18}{x-3}$

$(3)^3 + 4(3)^2 - 3(3) - 18$

$= 36$

5. $\dfrac{x^3-2x^2-23x+60}{x-2}$

$(2)^3 - 2(2)^2 - 23(2) + 60$

$= 14$

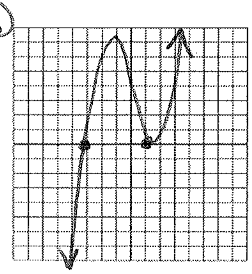
Use the given zero and long division to help find the remaining zeros then sketch the polynomial.

5. $x^3 + x^2 - 5x + 3$; 1 is a zero

$$\begin{array}{r} x^2 + 2x - 3 \\ x-1 \overline{\big) x^3 + x^2 - 5x + 3} \\ -\underline{\;x^3 - x^2\;} \\ 2x^2 - 5x \\ -\underline{\;2x^2 - 2x\;} \\ -3x + 3 \\ -\underline{\;-3x + 3\;} \\ 0 \end{array}$$

$x^3 \to$

(5)



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

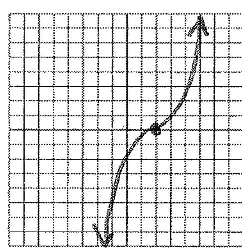
$(x+3)(x-1) = 0$

$x = -3, 1$

6. $x^3 - 6x^2 + 12x - 8$; 2 is a zero

$$\begin{array}{r} x^2 - 4x + 4 \\ x-2 \overline{\big) x^3 - 6x^2 + 12x - 8} \\ -\underline{\;x^3 - 2x^2\;} \\ -4x^2 + 12x \\ -\underline{\;-4x^2 + 8x\;} \\ 4x - 8 \\ -\underline{\;4x - 8\;} \\ 0 \end{array}$$

(6)



$x^2 - 4x + 4 = 0$

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

$x = 2$

7. $x^3 + 7x^2 + 7x - 15$; −3 is a zero

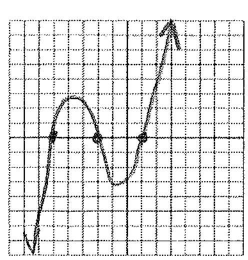
$$\begin{array}{r} x^2 + 4x - 5 \\ x+3 \overline{\big) x^3 + 7x^2 + 7x - 15} \\ -\underline{\;x^3 + 3x^2\;} \\ 4x^2 + 7x \\ -\underline{\;4x^2 + 12x\;} \\ -5x - 15 \\ -\underline{\;-5x - 15\;} \\ 0 \end{array}$$

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

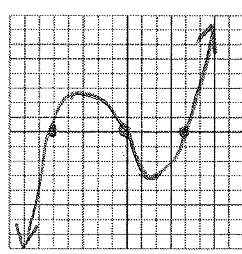
$(x+5)(x-1) = 0$

$x = -5, 1$

(7)



(8)



8. $x^3 + x^2 - 20x$; 4 is a zero

$$\begin{array}{r} x^2 + 5x \\ x-4 \overline{\big) x^3 + x^2 - 20x + 0} \\ -\underline{\;x^3 - 4x^2\;} \\ 5x^2 - 20x \\ -\underline{\;5x^2 - 20x\;} \\ 0 \end{array}$$

$x^2 + 5x = 0$

$x(x+5) = 0$ $x = 0, -5$