

Please show all work and box-in your final answer!

Section 2.3

Divide using long division.

1. $(x^3 - 9) \div (x^2 + 1)$

$$\begin{array}{r} x \\ x^2 + 1 \overline{) x^3 + 0x^2 + 0x - 9} \\ \underline{-x^3 \quad 0x^2 + x} \\ -x - 9 \end{array}$$

Ans: $x + \frac{-x-9}{x^2+1}$

a) Use synthetic division to find each function value.

b) Verify your answer by substitution.

2. $g(x) = 3x^3 + 5x^2 - 10x + 1$

a. $g(3)$

$$\begin{array}{r|rrrr} 3 & 3 & 5 & -10 & 1 \\ & \downarrow & 9 & 42 & 96 \\ \hline & 3 & 14 & 32 & \boxed{97} \end{array}$$

b) $g(3) = 3(3^3) + 5(3^2) - 10(3) + 1$
 $= 81 + 45 - 30 + 1$
 $= 97 \checkmark$

b. $g(-2)$

$$\begin{array}{r|rrrr} -2 & 3 & 5 & -10 & 1 \\ & \downarrow & -6 & 2 & 16 \\ \hline & 3 & -1 & -8 & \boxed{17} \end{array}$$

b) $g(-2) = 3(-2)^3 + 5(-2)^2 - 10(-2) + 1$
 $= -24 + 20 + 20 + 1$
 $= 17 \checkmark$

c. $k = 1/2$

$$\begin{array}{r|rrrr} \frac{1}{2} & 3 & 5 & -10 & 1 \\ & \downarrow & \frac{3}{2} & \frac{13}{4} & \\ \hline & 3 & \frac{13}{2} & \frac{-27}{4} & \boxed{-\frac{1}{8}} \end{array}$$

b) $g(1/2) = \frac{3}{8} + \frac{5}{4} - \frac{10}{2} + 1$
 $= -\frac{19}{8} \checkmark$

- a) Use synthetic division to show that x is a zero of the third-degree polynomial equation.
 b) Use the result to factor the polynomial completely.
 c) List all real zeros of the function.

3. $f(x) = 2x^3 + x^2 - 5x + 2$ ~~$x = -2$~~ $x = -2$

a)
$$\begin{array}{r|rrrr} -2 & 2 & 1 & -5 & 2 \\ & \downarrow & -4 & 6 & -2 \\ \hline & 2 & -3 & 1 & 0 \end{array}$$

c)
$$D = (x+2)(2x-1)(x-1)$$

$$x = -2, \frac{1}{2}, 1$$

b)
$$f(x) = (x+2)(2x^2 - 3x + 1)$$

$$= (x+2)(2x-1)(x-1)$$

Section 2.4

Find numbers a and b such that the equation is true.

4. $(a+6) + 2bi = 6 - 5i$

$$\begin{aligned} a + 6 &= 6 & 2b &= -5 \\ a &= 0 & b &= \frac{-5}{2} \end{aligned}$$

Write the complex numbers in terms of " i " and perform the indicated operation. Write the result in standard form.

5. $(8 + \sqrt{-18}) - (4 + \sqrt{12}i)$

$$= 8 + \sqrt{18}i - 4 - \sqrt{12}i$$

$$= 4 + 3\sqrt{2}i - 2\sqrt{3}i$$

$$= 4 + (3\sqrt{2} - 2\sqrt{3})i$$

6. $(9 - 2i)^2 + (6 + 4i)$

$$= (9 - 2i)(9 - 2i) + (6 + 4i)$$

$$= 81 - 36i - 4 + 6 + 4i$$

$$= 83 - 32i$$

Write the quotient in standard form.

$$7. \frac{8+16i}{2i} \cdot \frac{-2i}{-2i} = \frac{-16i+32}{-4} = 8 - 4i$$

or

$$\frac{8+16i}{2i} \cdot \frac{2i}{2i} = \frac{16i-32}{-4} = 8 - 4i$$

Use the quadratic formula to solve the quadratic equation.

8. $4x^2+16x+17=0$

$$x = \frac{-16 \pm \sqrt{16^2 - 4(4)(17)}}{2(4)}$$

$$= \frac{-16 \pm \sqrt{-16}}{8}$$

$$= -2 \pm \frac{1}{2}i$$

