Name: KEY worked out solutions available at: fur.ly/96ai

Practice

Chapter 5 Practice Test

Simplify the expression.

1. $\left(a^2b^2\right)^5 = a^{10} \cdot b^{10}$

2. $\left(-2a^2b^3c^4\right)^4 = (-2)^4 a^8 b^{12} c^{16} = 16a^8b^{12}c^{16}$

Be sure to apply the power of 4 to the (−2)

3. Use synthetic substitution to evaluate $f(s) = 6s^3 - 6s^2 - 2s + 2$ when $s = 2$.

$$\begin{array}{r|rrrr} 2 & 6 & -6 & -2 & 2 \\ & \downarrow & 12 & 12 & 20 \\ \hline & 6 & 6 & 10 & 22 \end{array}$$

* Watch for "missing degrees"

Find the sum or difference.

4. $\left(8h^3 - 8h + 8\right) - \left(7h^3 + 7h + 1\right) = 8h^3 - 8h + 8 - 7h^3 - 7h - 1$
$= h^3 - 15h + 7$

be sure to distribute this minus sign

5. $\left(9a^5 - 9a^4 + 1\right) + \left(6a^5 - 6a + 7\right) = 9a^5 - 9a^4 + 1 + 6a^5 - 6a + 7$
$= 15a^5 - 9a^4 - 6a + 8$

Find the product.

6. $(k-3)\left(k^2 + k + 2\right) = k^3 + k^2 + 2k - 3k^2 - 3k - 6$
$= k^3 - 2k^2 - k - 6$

Distribute the "−3"

Distribute the "k"

Factor the polynomial completely.

7. $2b^3 - 4b^2 + 10b$ $= 2b(b^2 - 2b + 5)$

Common monomial factor

Find the real-number solutions of the equation.

8. $v^3 - 2v^2 = 0$ $v^2(v-2) = 0$ $v^2 = 0$ $v - 2 = 0$

Common monomial factor

zero product property

$v = 0$ $v = 2$

Given polynomial *f(x)* and a factor of *f(x)*, factor *f(x)* completely.

9. $f(x) = x^3 + 4x^2 + x - 6$ given that $(x + 2)$ is a factor.

if (x+2) is a factor, then -2 is a zero (put outside on synthetic division)

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

$f(x) = (x+2)\underbrace{(x^2 + 2x - 3)}_{\text{factor this general trinomial}} = (x+2)(x+3)(x-1)$

10. $f(x) = 2x^3 - 15x^2 + 34x - 21$ given that $(x - 1)$ is a factor.

$\hookrightarrow$ 1 is a zero; put outside on synthetic division

$$\begin{array}{r|rrrr} 1 & 2 & -15 & 34 & -21 \\ & \downarrow & 2 & -13 & 21 \\ \hline & 2 & -13 & 21 & 0 \end{array}$$

$f(x) = (x-1)\underbrace{(2x^2 - 13x + 21)}_{\text{Factor this general trinomial.}} = (x-1)(2x-7)(x-3)$

Given polynomial function *f* and a zero of *f*, find the other zeros.

11. $f(x) = x^3 + 8x^2 + 5x - 14$ given that -2 is one of the zeros.

$$\begin{array}{r|rrrr} -2 & 1 & 8 & 5 & -14 \\ & \downarrow & -2 & -12 & 14 \\ \hline & 1 & 6 & -7 & 0 \end{array}$$

$(x^2 + 6x - 7) = (x+7)(x-1) = 0$ $x + 7 = 0$ $x - 1 = 0$

$x = -7$ $x = 1$

The zeros are: -2, -7, 1

List the possible rational zeros of the function using the rational zeros theorem.

12. $f(x) = 2x^3 + 3x^2 - 11x - 6$

constant term (p) = −6 : Factors: ±1, ±2, ±3, ±6

lead coefficient (q) = 2 : Factors: ±1, ±2

Final List

Possible Rational Zeros: $\frac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1, \pm 2} = \boxed{\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{2}, \pm \frac{3}{2}}$

Find all real zeros of the function.

13. $p(x) = 2x^3 + 20x^2 + 62x + 60$

$$\begin{array}{r|rrrr} 1 & 2 & 20 & 62 & 60 \\ & & 2 & 22 & 84 \\ \hline & 2 & 22 & 84 & 144 \end{array}$$

1 not a zero

$$\begin{array}{r|rrrr} -1 & 2 & 20 & 62 & 60 \\ & & -2 & -18 & -44 \\ \hline & 2 & 18 & 44 & 16 \end{array}$$

−1 Not

$$\begin{array}{r|rrrr} 2 & 2 & 20 & 62 & 60 \\ & & 4 & 48 & 220 \\ \hline & 2 & 24 & 110 & 282 \end{array}$$

not

$$\begin{array}{r|rrrr} -2 & 2 & 20 & 62 & 60 \\ & & -4 & -32 & -60 \\ \hline & 2 & 16 & 30 & 0 \end{array}$$

−2 is a zero

$p(x) = (x+2)(2x^2+16x+30)$

$= (x+2) \cdot 2 \cdot (x^2+8x+15)$

$= 2(x+2)(x+3)(x+5)$

$x+2=0 \quad x+3=0 \quad x+5=0$

$x=-2 \quad x=-3 \quad x=-5$

14. $f(x) = x^4 + 3x^3 - 3x^2 - 11x - 6$

$$\begin{array}{r|rrrrr} -1 & 1 & 3 & -3 & -11 & -6 \\ & & -1 & -2 & 5 & 6 \\ \hline -1 & 1 & 2 & -5 & -6 & 0 \\ & & -1 & -1 & 6 & \\ \hline & 1 & 1 & -6 & 0 & \end{array}$$

(x+1) is a factor

−1 is a repeated solution

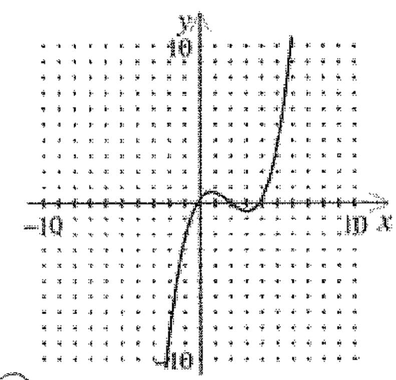
$\underbrace{1 \quad 1 \quad -6}_{x^2+x-6} = (x+3)(x-2)$

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

$x+1=0 \quad x+1=0 \quad x+3=0 \quad x-2=0$

$x=-1 \quad x=-1 \quad x=-3 \quad x=2$

____ 15. Use the graph to approximate the real zeros of the function. Round to the nearest integer.



a. 0, 2, 4 b. −4, −2, 0 c. 2, −4, −2, 0 d. 2

the curve intersects the x-axis at these points.