1. Which of the following polynomials has x + 1 as a factor?
   A. $x^3 + x^2 + x + 1$
   B. $x^4 + x^3 + x^2 + x + 1$
   C. $x^4 + 3x^3 + 3x^2 + x + 1$
   D. $x^3 + 2x^2 + 2x + 2$ (D)

Explanation: x + 1 is a factor of both $x^3 + x^2 + x + 1$ and $x^4 + 3x^3 + 3x^2 + x + 1$. You can use the Factor Theorem to check this by substituting x = - 1 into the polynomials.

2. Use the Factor Theorem to determine whether g(x) = x + 1 is a factor of $p(x) = 2x^3 + x^2 - 2x + 1$
   A. Yes
   B. No
   C. It cannot be determined
   D. None of the above (A)

Explanation: Using the Factor Theorem, substitute x = - 1 into $p(x) = 2x^3 + x^2 - 2x + 1$ If p(- 1) = 0 then g(x) = x + 1 is a factor. After calculation, p(- 1) = 0 so g(x) = x + 1 a factor.

3. Which of the following polynomials has x + 2 as a factor?
   A. $p(x) = x^3 + 3x^2 + 3x + 1$
   B. $p(x) = x^3 - 4x^2 + x + 6$
   C. $p(x) = x^3 + 2x^2 - 4x + 8$
   D. $p(x) = x^2 + 2x - 8$ (C)

Explanation: Use the Factor Theorem for each polynomial by substituting x = 2. For $p(x) = x^3 + 2x^2 - 4x + 8$ and $p(x) = x^2 + 2x - 8$ p(- 2) = 0 so both are divisible by x + 2

4. For $p(x) = x^2 + x + k$, find the value of k if x – 1 is a factor of p(x).
   A. k = 0 B. k = 1
   C. k = - 1 D. k = 2 (B)

Explanation: Using the Factor Theorem, substitute x = 1 into $p(x) = x^2 + x + k$ Solving p(1) = 1 + 1 + k = 0 gives k = - 2

5. What is the value of k if x - 2 is a factor of $p(x) = x^3 + 2x^2 - 4x + k$?
   A. k = 4 B. k = 6
   C. k = 8 D. k = 2 (A)

Explanation : Using the Factor Theorem, substitute x = 2 into $p(x) = x^3 + 2x^2 - 4x + k$ Solving p(2) = 8 + 8 - 8 + k = 0 gives k = - 8

6. Which of the following polynomials has x – 1 as a factor?
   A. $x^2 - 2x + 1$
   B. $x^2 + 2x + 3$
   C. $x^3 + 3x^2 - 4x - 4$
   D. $x^3 + x^2 - 2x + 2$ (A)

Explanation: By substituting x = 1 into each polynomial, we find that $x^2 - 2x + 1$ has x - 1as a factor because p(1) = 0

7. Use the Factor Theorem to determine whether g(x) = x - 1 is a factor of $p(x) = x^3 - 4x^2 + 3x + 6$
   A. Yes
   B. No
   C. Cannot be determined
   D. None of the above (A)

Explanation: By the Factor Theorem, if g(x) = x - 1 is a factor, then p(1) = 0 Substituting x = 1 into $p(x) = x^3 - 4x^2 + 3x + 6$ we find that p(1) = 0 so g(x) = x - 1 is a factor

8. Which of the following is the factorization of $x^2 - 5x + 6$?
   A. (x - 2)(x - 3)
   B. (x + 2)(x - 3)
   C. (x - 1)(x - 6)
   D. (x + 3)(x + 2) (A)

Explanation: The factorization of $x^2 - 5x + 6$ is (x - 2)(x - 3)

9. Find the value of k for which x - 3 is a factor of the polynomial $p(x) = x^3 + kx^2 - 5x + 6$
   A. k = 2
   B. k = 3
   C. k = - 2
   D. k = - 3 (C)

Explanation: By the Factor Theorem, substituting x = 3 into $p(x) = x^3 + kx^2 - 5x + 6$, we find p(3) = 27 + 9k - 15 + 6 = 0 k = - 2

10. Which of the following is the factorization of $x^3 + 4x^2 - 2x – 8$
    A. $(x + 2)(x^2 - 2x - 4)$
    B. $(x + 4)(x^2 - 4x - 2)$
    C. . $(x - 2)(x^2 + 2x + 4)$
    D. $(x + 2)(x^2 + 2x + 4)$ (D)

Explanation: The factorization of $x^3 + 4x^2 - 2x - 8$ is $(x + 2)(x^2 + 2x + 4)$

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