

Answer on Question #54825 – Math – Calculus

1. (An Intermediate Algebra review exercise) Use polynomial long division to perform the indicated division. Write the polynomial in the form:

$$p(x) = d(x)q(x) + r(x).$$

$$(9x^4 - 3x^3 + 2x^2 - 9) \div (x^2 + 4)$$

$$p(x) =$$

Solution.

$$\begin{array}{r|l}
 9x^4 - 3x^3 + 2x^2 - 9 & x^2 + 4 \\
 \underline{9x^4 + 36x^2} & 9x^2 - 3x - 34 \\
 -3x^3 - 34x^2 - 9 & \\
 \underline{-3x^3 - 12x} & \\
 -34x^2 + 12x - 9 & \\
 \underline{-34x^2 - 136} & \\
 12x + 127 &
 \end{array}$$

Answer: $p(x) = (9x^2 - 3x - 34)(x^2 + 4) + (12x + 127).$

2. Use polynomial long division to perform the indicated division. Write the polynomial in the form:

$$p(x) = d(x)q(x) + r(x).$$

$$(-x^5 + 8x^3 - x) \div (x^3 - x^2 + 8)$$

$$p(x) =$$

Solution.

$$\begin{array}{r|l}
 -x^5 + 8x^3 - x & x^3 - x^2 + 8 \\
 \underline{-x^5 + x^4 - 8x^2} & -x^2 - x + 7 \\
 -x^4 + 8x^3 + 8x^2 - x & \\
 \underline{-x^4 + x^3 - 8x} & \\
 7x^3 + 8x^2 + 7x & \\
 \underline{7x^3 - 7x^2 + 56} & \\
 15x^2 + 7x - 56 &
 \end{array}$$

Answer: $p(x) = (x^3 - x^2 + 8)(-x^2 - x + 7) + (15x^2 + 7x - 56).$

3. For the polynomial given below, you are given one of its zeros. Use the techniques in this section to find the rest of the real zeros. (Enter your answers as a comma-separated list.)

$$x^3 - 6x^2 + 11x - 6, c = 1$$

$$x =$$

Solution.

$$\begin{array}{r|l} x^3 - 6x^2 + 11x - 6 & x - 1 \\ \hline \underline{x^3 - x^2} & x^2 - 5x + 6 \\ -5x^2 + 11x - 6 & \\ \underline{-5x^2 + 5x} & \\ 6x - 6 & \\ \underline{6x - 6} & \\ 0 & \end{array}$$

$$x^3 - 6x^2 + 11x - 6 = (x - 1)(x^2 - 5x + 6) = (x - 1)(x - 2)(x - 3)$$

Answer: $x_1 = 1, x_2 = 2, x_3 = 3.$

4. For the polynomial given below, you are given one of its zeros. Use the techniques in this section to find the rest of the real zeros. (Enter your answers as a comma-separated list.)

$$x^3 - 12x^2 + 48x - 64, c = 4$$

$$x =$$

Solution.

$$\begin{array}{r|l} x^3 - 12x^2 + 48x - 64 & x - 4 \\ \hline \underline{x^3 - 4x^2} & x^2 - 8x + 16 \\ -8x^2 + 48x - 64 & \\ \underline{-8x^2 + 32x} & \\ 16x - 64 & \\ \underline{16x - 64} & \\ 0 & \end{array}$$

$$x^3 - 12x^2 + 48x - 64 = (x - 4)(x^2 - 8x + 16) = (x - 4)(x - 4)(x - 4)$$

Answer: $x_1 = 4, x_2 = 4, x_3 = 4.$