

Show All work!

<p>1) Simplify and Classify by degree and number of terms. A. $(-8d^3 - 7) - (-d^3 - d^2 - 6)$</p> $-8d^3 - 7 + d^3 + d^2 + 6$ $\underline{-7d^3 + d^2 - 1}$ <p>B. $x(x-3) - 2x(x-3)$ <i>Cubic Tr.</i></p> $x^2 - 3x - 2x^2 + 6x$ $\underline{-x^2 + 3x}$ <i>Quad B.</i>	<p>2) Write a polynomial function in standard form with the roots $0, \frac{-2}{5}, 3$</p> $y = x(x-3)(5x+2)$ $y = x(5x^2 - 13x - 6)$ $y = 5x^3 - 13x^2 - 6x$
<p>3) Solve to find all the roots. $x^3 - 64 = 0$</p> $(x-4)(x^2 + 4x + 16) = 0$ <p>$x = 4$</p> $x^2 + 4x + 16 = -16 + 4$ $(x+2)^2 = -12$ $x+2 = \pm 2i\sqrt{3}$ $-2 \pm 2i\sqrt{3}$	<p>4) Solve to find all the roots. $8x^3 - 1 = 0$</p> $(2x-1)(4x^2 + 2x + 1) = 0$ $x = \frac{1}{2}$ $x = \frac{-2 \pm \sqrt{4 - 4(4)(1)}}{2(4)}$ $x = \frac{-2 \pm 2i\sqrt{3}}{8}$ $x = \frac{-1 \pm i\sqrt{3}}{4}$
<p>5) Divide using synthetic division. $(x^4 - 6x^2 - 27) \div (x + 2)$</p> $\begin{array}{r rrrrr} -2 & 1 & 0 & -6 & 0 & -27 \\ & & -2 & 4 & 4 & -8 \\ \hline & 1 & -2 & -2 & 4 & -35 \end{array}$ $\underline{1x^3 - 2x^2 - 2x + 4 - \frac{35}{x+2}}$	<p>6) Divide using long division. $(7x^3 + 11x^2 + 7x + 5) \div (x^2 + 1) = 6/x^2 + 1$</p> $\begin{array}{r} 7x^3 + 11x^2 + 7x + 5 \\ \underline{7x^3 + 7x} \\ 11x^2 + 5 \\ \underline{11x^2 + 11} \\ -6 \end{array}$

Solve to find all zeros.

$$f(x) = x^3 - 6x^2 + 4x + 16$$

$\{4, 1 \pm \sqrt{5}\}$

$$\begin{array}{r} 4 \overline{) 1 \quad -6 \quad 4 \quad 16} \\ \underline{ 4 \quad -8 \quad 16} \\ 1 \quad -2 \quad -4 \quad 0 \end{array}$$

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

$$x^2 - 2x + \square = 4 + \square$$

$$\sqrt{(x-1)^2} = \sqrt{5}$$

$$x-1 = \pm \sqrt{5}$$

8) Solve to find all zeros.

$$f(x) = x^3 - 9x^2 + 28x - 30$$

$\{3, 3 \pm i\}$

$$\begin{array}{r} 3 \overline{) 1 \quad -9 \quad 28 \quad -30} \\ \underline{ 3 \quad -18 \quad 30} \\ 1 \quad -6 \quad 10 \quad 0 \end{array}$$

$$x^2 - 6x + 10 = 0$$

$$x^2 - 6x + 9 = -10 + 9$$

$$(x-3)^2 = -1$$

$$x-3 = \pm i$$

9) You want to make an open top box from cardboard. The original cardboard is 20 X 30. Find the maximum volume and the length of the cut. Round to the nearest hundredth.

$$y = x(20-2x)(30-2x)$$

Length 3.92

Max Vol. 1056.31

10) Is $(x+3)$ a factor of

$6x^3 + 25x^2 + 15x - 15 = 0$? If so, find the remaining factors.

$$\begin{array}{r} +3 \overline{) 6 \quad -4 \quad 15 \quad -15} \\ \underline{ 18 \quad -9 \quad -15} \\ 1 \quad -1 \quad -2 \quad 0 \end{array}$$

$$x^2 - x - 2$$

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

11) Solve: $x^4 - 12x^2 - 64 = 0$

$$x^2 - 16 \quad x^2 + 4$$

$$x = \pm 4 \quad x = \pm 2i$$

12) Solve: $x^4 - x^2 - 72 = 0$

$$x^2 - 9 \quad x^2 + 8$$

$$\pm 3 \quad \pm 2\sqrt{2}$$

13) Find the discriminant and describe the roots of $3x^2 + 2x - 8 = 0$

$$2^2 - 4(3)(-8)$$

$$4 + 96$$

100

$$x^2 - 2x + 7 = 0$$

$$(-2)^2 - 4(1)(7)$$

$$4 - 28$$

$$-24$$

2 Real
2 Imag.

14) Solve by completing the square

$$x^2 - 6x - 15 = 0$$

$$x^2 - 6x + 9 = 15 + 9$$

$$(x-3)^2 = 24$$

$$x-3 = \pm 2\sqrt{6}$$

$$3 \pm 2\sqrt{6}$$