

Extra Practice

1. Divide using synthetic division:

$$(p^3 - 10p^2 + 20p + 26) \div (p - 5)$$

$$p^2 - 5p - 5 + \frac{1}{p-5}$$

$$\begin{array}{r|rrrr} 5 & 1 & -10 & 20 & 26 \\ & & 5 & -25 & -25 \\ \hline & 1 & -5 & -5 & 1 \end{array}$$

2. Divide using long division:

$$6x^3 + 10x^2 + x + 8$$

$$2x^2 + 1$$

$$3x + 5 + \frac{-2x+3}{2x^2+1}$$

$$\begin{array}{r} 2x^2+1 \overline{) 6x^3+10x^2+x+8} \\ \underline{6x^3 + 3x} \\ 10x^2 - 2x + 8 \\ \underline{10x^2 + 5} \\ -2x + 3 \end{array}$$

3. Divide using synthetic division:

$$(k^3 - 30k - 18 - 4k^2) \div (3 + k)$$

$$k^2 - 7k - 9 + \frac{9}{3+k}$$

$$\begin{array}{r|rrrr} -3 & 1 & -4 & -30 & -18 \\ & & -3 & 21 & 27 \\ \hline & 1 & -7 & -9 & 9 \end{array}$$

$$\begin{array}{r} 3x-2 \overline{) 6x^3-16x^2+17x-6} \\ \underline{6x^3-4x^2} \\ -12x^2+17x-6 \\ \underline{-12x^2+8x} \\ 9x-6 \\ \underline{9x-6} \\ 0 \end{array}$$

4. Divide using long division:

$$\frac{6x^3 - 16x^2 + 17x - 6}{3x - 2}$$

$$= 2x^2 - 4x + 3$$

- 5-7. Factor Completely:

$$-3x^4 + 30x^3 - 75x^2$$

$$-3x^2(x-5)^2$$

$$-3x^2(x^2 - 10x + 25)$$

$$-3x^2(x-5)(x-5)$$

$$27x^3 - 1$$

$$(3x-1)(9x^2+3x+1)$$

$$125x^9 + 27y^6$$

$$(5x^3 + 3y^2)(25x^6 - 15x^3y^2 + 9y^4)$$

- 8-10. Solve Completely:

$$x^4 - 36 = 0$$

$$x = \pm\sqrt{6}, \pm i\sqrt{6}$$

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

$$x^2-6=0 \quad x^2+6=0$$

$$\sqrt{x^2}=\sqrt{6} \quad \sqrt{x^2}=\sqrt{-6}$$

$$x=\pm\sqrt{6} \quad x=\pm i\sqrt{6}$$

$$x^4 - 10x^2 + 21 = 0$$

$$x = \pm\sqrt{7}, \pm\sqrt{3}$$

$$(x^2-7)(x^2-3)=0$$

$$x^2=7 \quad x^2=3$$

$$x=\pm\sqrt{7} \quad x=\pm\sqrt{3}$$

$$3k^3 - 5 = -2192$$

$$k = -9, \frac{9 \pm 9i\sqrt{3}}{2}$$

$$3k^3 + 2187 = 0$$

$$3(k^3 + 729) = 0$$

$$3(k + 9)(k^2 - 9k + 81) = 0$$

$$k = -9$$

$$x = \frac{9 \pm \sqrt{81 - 4(1)(81)}}{2} = \frac{9 \pm \sqrt{-243}}{2}$$

$$x = \frac{9 \pm i\sqrt{243}}{2} = \frac{9 \pm 3i\sqrt{27}}{2} = \frac{9 \pm 9i\sqrt{3}}{2}$$

11. Expand:

$$(2x - 1)^5$$

$$1(2x)^5 + 5(2x)^4(-1)^1 + 10(2x)^3(-1)^2 + 10(2x)^2(-1)^3 + 5(2x)(-1)^4 + 1(-1)^5$$

$$32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$$

12. Determine $P(2)$:

Given $P(x) = 11x^4 + 8x^3 - 7x^2 - 1$.

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$$\begin{array}{r} 2 \overline{) 11 \ 8 \ -7 \ 0 \ -1} \\ \underline{22 \ 60 \ 106 \ 212} \\ 11 \ 30 \ 53 \ 106 \ \underline{211} \end{array}$$

13. Graph Modeling:

The table shows the total U.S. biomass energy consumptions y (in trillions of British thermal units, or Btus) in the year t , where $t = 1$ corresponds to 2001. Find a polynomial model for the data. Use the model to estimate the total U.S. biomass energy consumption in 2013.

t	1	2	3	4	5	6
y	2622	2701	2807	3010	3117	3267

t	7	8	9	10	11	12
y	3493	3866	3951	4286	4421	4316

LinReg

$$y = ax + b$$

$$a = 180.5769231$$

$$b = 2314.333333$$

QuadReg

$$y = ax^2 + bx + c$$

$$a = 2.31993007$$

$$b = 150.4178322$$

$$c = 2384.704545$$

CubicReg

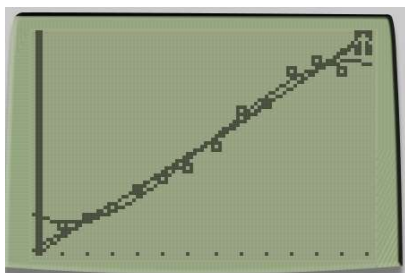
$$y = ax^3 + bx^2 + cx + d$$

$$a = -2.545325045$$

$$b = 51.95376845$$

$$c = -118.1139601$$

$$d = 2732.141414$$



Cubic

$$y = -2.545x^3 + 51.954x^2 - 118.114x + 2732.141$$