Find this quotient. Give remainder in any form.

$$\frac{8x^4 + 2x^3 - 3x^2 + 24x + 17}{4x + 3}$$

$$\begin{array}{r} 2x^3 - x^2 \quad\quad + 6 \quad R = -1 \\ 4x+3 \,\big)\, 8x^4 + 2x^3 - 3x^2 + 24x + 17 \\ -\;\; 8x^4 + 6x^3 \quad\quad\quad\quad\quad\quad \\ \hline -4x^3 - 3x^2 \quad\quad\quad \\ -\;\; -4x^3 - 3x^2 \quad\quad\quad \\ \hline 0 + 24x + 17 \\ -\;\; 24x + 18 \\ \hline -1 \end{array}$$

bring down next two terms

if all the terms cancel when subtracting you need to "bring down" the same number of terms as there is in the divisor

Find this quotient. Give remainder in any form.

$$\frac{12x^3 + 2x^2 + 11}{3x + 5}$$

missing term

When there is a missing term in the dividend it is easier if you put a zero in that place before you do the division.

$$\begin{array}{r} 4x^2 - 6x + 10 \quad R = -39 \\ 3x+5 \,\big)\, 12x^3 + 2x^2 + 0x + 11 \\ -\;\; 12x^3 + 20x^2 \quad\quad\quad\quad \\ \hline -18x^2 + 0x \quad\quad \\ -18x^2 - 30x \quad\quad \\ \hline 30x + 11 \\ -\;\; 30x + 50 \\ \hline -39 \end{array}$$

Find this quotient. Give remainder in any form.

$$\frac{10x^4 - 45x^3 + 82x^2 - 54x + 84}{5x^2 + 6}$$

$$\begin{array}{r} 2x^2 - 9x + 14 \\ 5x^2 \boxed{+0x} + 6 \,\big)\, 10x^4 - 45x^3 + 82x^2 - 54x + 84 \\ -\;\; 10x^4 + 0x^3 + 12x^2 \quad\quad\quad\quad \\ \hline -45x^3 + 70x^2 - 54x \quad\quad \\ -\;\; -45x^3 + 0x^2 - 54x \quad\quad \\ \hline 70x^2 + 0x + 84 \\ 70x^2 + 0x + 84 \\ \hline 0 \end{array}$$

when there is a missing term in the divisor it is easier if you put a zero in that spot. This way terms will line up when it comes time to subtract.

What must be true for a number to be a factor of another number?

There must be NO remainder when they are divided.

Is $x + 4$ a factor of $2x^3 - 12x^2 + 8x - 20$

$$\begin{array}{r} 2x^2 - 20x + 88 \\ x+4 \,\big)\, 2x^3 - 12x^2 + 8x - 20 \\ -\;\; 2x^3 + 8x^2 \quad\quad\quad\quad \\ \hline -20x^2 + 8x \quad\quad \\ -\;\; -20x^2 - 80x \quad\quad \\ \hline 88x - 20 \\ 88x + 352 \\ \hline -372 \end{array}$$

No, x+4 is not a factor because the remainder isn't zero.

Now you can finish Hwk #30

Sec 6-3

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Problems 9, 10, 37-41

Due on Monday, Jan 9.

7 and 9 are factors of 2457. The other two factors are prime numbers. Find these other two factors.

$$7\overline{)2457} = 351$$
$$21,\ 35,\ 35,\ 07$$

$$9\overline{)351} = 39$$
$$27,\ 81$$

$$39 = 3 \times 13$$

Divide 2457 by one of the factors (2457÷7 = 351). This quotient is then divided by the other factor (351÷9)=39. This quotient is then factored further (39 = 3x13). Therefore, the four factors described are: 7, 9, 3, and 13

Find real solutions by graphing.

$$x^3 - 7x^2 + 25x - 39 = 0$$

The solution found by graphing is x=3. This solution(x-int) came from the following factor: (x-3)

Use this information to find ALL Complex solutions by dividing to find another factor.

$$x-3\overline{)x^3 - 7x^2 + 25x - 39} = x^2 - 4x + 13$$
$$x^3 - 3x^2$$
$$-4x^2 + 25x$$
$$-4x^2 + 12x$$
$$13x - 39$$
$$13x - 39$$
$$0$$

The other factor is:
x^2 - 4x + 13

By using the Quadratic Formula you can find the other two solutions.

$$b^2 - 4ac = -36$$

$$x = \frac{4 \pm \sqrt{-36}}{2} = \frac{4 \pm 6i}{2} = 2 \pm 3i$$

$$\boxed{\text{The three solutions are } x = 3,\ 2\pm3i}$$