Name Key Date_____ Hour_____

6.7 - Remainder & Factor Theorems Alg 2/Trig

There's a connection between synthetic division and evaluating (or finding $f(a)$). See if you can figure it out as you work through the problems below:

1. $f(x) = 2x^2 - 3x + 1$

a. $f(2) = 2(2)^2 - 3(2) + 1$

$= 8 - 6 + 1$

$= \boxed{3}$

b. $\dfrac{2x^2 - 3x + 1}{x - 2} =$

$$\begin{array}{r|rrr} 2 & 2 & -3 & 1 \\ & +0 & 4 & 2 \\ \hline & 2 & 1 & \boxed{3} \end{array}$$

2. $f(x) = x^4 - 5$

a. $f(1) = (1)^4 - 5$

$= \boxed{-4}$

b. $\dfrac{x^4 - 5}{x - 1} =$

$$\begin{array}{r|rrrrr} 1 & 1 & 0 & 0 & 0 & -5 \\ & +0 & 1 & 1 & 1 & 1 \\ \hline & 1 & 1 & 1 & 1 & \boxed{-4} \end{array}$$

3. $f(x) = x^3 - 3x + 4$

a. $f(-2) = (-2)^3 - 3(-2) + 4$

$= -8 + 6 + 4$

$= \boxed{2}$

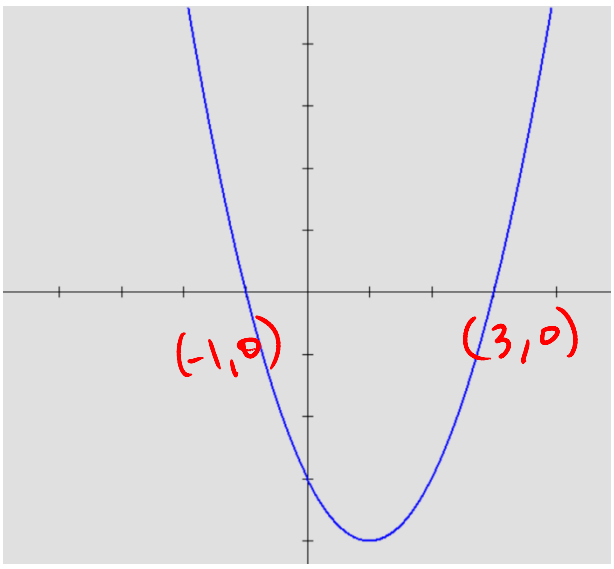
b. $\dfrac{x^3 - 3x + 4}{x + 2} =$

$$\begin{array}{r|rrrr} -2 & 1 & 0 & -3 & 4 \\ & +0 & -2 & 4 & -2 \\ \hline & 1 & -2 & 1 & \boxed{2} \end{array}$$

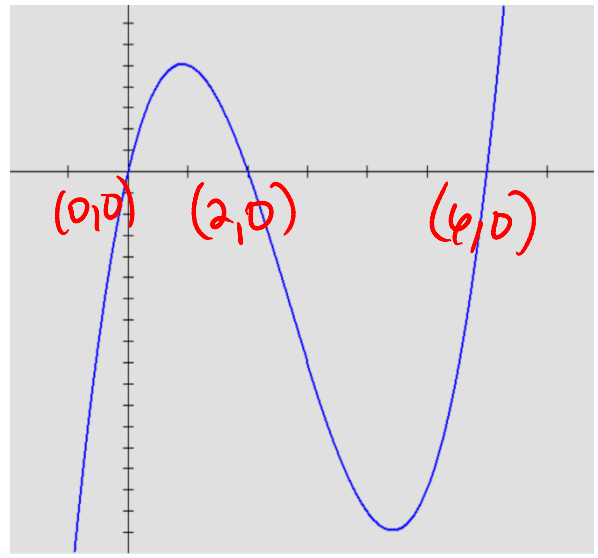
Remainder Theorem: If a polynomial $f(x)$ is divided by $(x-a)$, the remainder is the constant $f(a)$.

Factors of Polynomials

1. y = $f(x)$



2. y = $g(x)$



a. Write an equation in factored form for each polynomial. (They each have a vertical stretch factor of 1).

$f(x) = (x+1)(x-3)$

$g(x) = x(x-2)(x-6)$

b. Use the graphs above to evaluate. **Careful!** <u>One</u> of these answers can only be estimated.

$f(-1) = 0$

$f(3) = 0$

$f(2) =$ between -2 and -3

$g(0) = 0$

$g(2) = 0$

$g(6) = 0$

3) If $(x-2)$ is a factor of x^3+3x^2-6x-8, find the other factors.

$$\begin{array}{r|rrrr} 2 & 1 & 3 & -6 & -8 \\ & +0 & 2 & 10 & 8 \\ \hline & 1 & 5 & 4 & 0 \end{array}$$

$(x-2)(x^2+5x+4)$

can I still factor?

YES! ☺

$\boxed{(x-2)(x+4)(x+1)}$

4) Find all the zeros (solutions) of $x^3-3x^2-41x+203$ if one of the zeros is -7.

$$\begin{array}{r|rrrr} -7 & 1 & -3 & -41 & 203 \\ & +0 & -7 & 70 & -203 \\ \hline & 1 & -10 & 29 & 0 \end{array}$$

$(x+7)(x^2-10x+29)$

can I still factor?

NO ☹ USE QUADRATIC FORMULA

$x = \frac{10 \pm \sqrt{-16}}{2} = \frac{10 \pm 4i}{2} = \boxed{5 \pm 2i}$

* so $x = -7, 5 \pm 2i$ (3 solutions!)