ANSWER KEY

COMMON CORE ALGEBRA II
HOMEWORK #1-10
SYNTHETIC DIVISION & THE REMAINDER THEOREM

1. Which of the following is the remainder when the polynomial x^2-5x+3 is divided by $(x-8)$?

$x=8$

$(8)^2-5(8)+3$

$=27$

(1) 107 (3) 3

(2) 27 (4) 9

2. When the polynomial $p(x)$ was divided by the factor $x-7$ the result was $x+\frac{11}{x-7}$. Which of the following is the value of $p(7)$?

$11 \leftarrow$ remainder when $p(x)$ is divided by $x-7$.

$p(7)=11$

$x=7$

(1) -8 (3) 11

(2) 7 (4) It does not exist

3. Which of the following binomials is a factor of the quadratic $4x^2-35x+24$? Try to do this without factoring but by using the Remainder Theorem.

~~(1)~~ $x+6$, $x=-6$ (3) $x-8$, $x=8$

~~(2)~~ $x-4$, $x=4$ ~~(4)~~ $x+2$, $x=-2$

$4(-6)^2-35(-6)+24=378$

$4(4)^2-35(4)+24=-52$

$4(8)^2-35(8)+24=0$

$4(-2)^2-35(-2)+24=110$

4. Determine if $(x-1)$ is a factor of $(3x^2-2x-4)$ two ways.

$x=1$

Using Synthetic Division:

$$\begin{array}{c|ccc} 1 & 3 & -2 & -4 \\ & \downarrow & 3 & 1 \\ \hline & 3 & 1 & -3 \end{array}$$

↑ Remainder

Using the Remainder Theorem:

$3(1)^2-2(1)-4=-3$

↑ Remainder

No, $x-1$ is not a factor of $3x^2-2x-4$

5. Solve the following problems using synthetic division.

a. $(2x^3+3x^2-4x+1)\div(x-2)$

$$\begin{array}{c|cccc} 2 & 2 & 3 & -4 & 1 \\ & \downarrow & 4 & 14 & 20 \\ \hline & 2 & 7 & 10 & 21 \\ & x^2 & x & c & R \end{array}$$

$$2x^2+7x+10+\frac{21}{x-2}$$

b. $\dfrac{x^4+16}{x+4}$

$$\begin{array}{c|ccccc} -4 & 1 & 0 & 0 & 0 & 16 \\ & \downarrow & -4 & 16 & -64 & 256 \\ \hline & 1 & -4 & 16 & -64 & 272 \\ & x^3 & x^2 & x & c & R \end{array}$$

$$x^3-4x^2+16x-64+\frac{272}{x+4}$$

6. Use an appropriate procedure to show that $x-2$ is a factor of the function $f(x)=x^3-4x^2+7x-6$

$x=2$

Remainder Theorem

$f(2)=(2)^3-4(2)^2+7(2)-6=0$

Synthetic Division

$$\begin{array}{c|cccc} 2 & 1 & -4 & 7 & -6 \\ & \downarrow & 2 & -4 & 6 \\ \hline & 1 & -2 & 3 & 0 \\ & x^2 & x & c & R \end{array}$$

Long Division

$$\begin{array}{r} x^2-2x+3 \\ x-2\overline{)\,x^3-4x^2+7x-6} \\ -(x^3-2x^2)\downarrow \\ \hline -2x^2+7x \\ -(-2x^2+4x)\downarrow \\ \hline 3x-6 \\ -(3x-6) \\ \hline 0 \end{array}$$

7. Factor completely: $x^4+4x^2-3x^3-12x-4x^2-16$

$x^4-3x^3-12x-16$

Rearrange the terms!

DOTS: $x^4-16-3x^3-12x$ GCF

$(x^2+4)(x^2-4)-3x(x^2+4)$

$(x^2+4)(x^2-4-3x)$

$(x^2+4)(x^2-3x-4)$

$(x^2+4)(x-4)(x+1)$

8. Factored completely, the expression $12x^4+10x^3-12x^2$ is equivalent to

(1) $x^2(4x+6)(3x-2)$

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

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

(4) $2x^2(2x+3)(3x-2)$

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$2x^2(6x^2+5x-6)$

$2x^2(6x^2+9x-4x-6)$

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

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