HW SOL 4.8

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Name:_____ Date:_____

Math 10 Honors Section 4.8 Long Division:

1. Divide and find the quotient. Write the division statement for each of the following:

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

$x-1$ R 3

ii) $\frac{x^3-5x^2+10x-15}{x-3}$

x^2-2x+4 R -3

iii) $\frac{x^3+13x^2+39x+20}{x+9}$

x^2+4x+3 R -7

iv) $\frac{x^3-12x-20}{x+2}$

x^2-2x-8 R -4

v) $\frac{x^4+x^2-3x-1}{2x+1}$ $2x+1=0$, $x=-\frac{1}{2}$

$\frac{1}{2}x^3-\frac{1}{4}x^2+\frac{5}{8}x-\frac{29}{16}$ R $\frac{13}{16}$

$\left(-\frac{1}{2}\right)^4+\left(\frac{1}{2}\right)^2-3\left(\frac{1}{2}\right)-1$

$\frac{1}{16}+\frac{4}{16}+\frac{24}{16}-\frac{16}{16}=\frac{13}{16}$

vi) $\frac{2x^3-13x+5x^2-28}{x+3}$

$2x^2-x-10$ R 2

vii) $\frac{32x^3-18x+16x^2+9}{2x^2+1}$

$16x+8$ R $-34x+1$

Q: $16x+8$

R $=-34x+1$

viii) $\frac{-2x^3+4x^2-3x+5}{4x^2+5}$

$-\frac{1}{2}x+1$ R $\frac{3}{2}x$

ix) $\frac{2x^3+8x^4-3x^2+1+7x}{4x+1}$

$2x^3-\frac{3}{4}x+\frac{31}{16}$ R $-\frac{15}{16}$

$\frac{x^4-1}{x-1}$

$\frac{(x^2-1)(x^2+1)}{(x-1)}$

$\frac{(x+1)(x-1)(x^2+1)}{(x-1)}$

$= (x+1)(x^2+1)$

$\frac{9x^2-5}{3x+2}$

$3x+2 \overline{)\,9x^2-5}$

$3x+2$

$9x^2 - 6x$

$6x - 5$

$6x + 4$

-9

$\frac{x^4+x^3+x^2+x+1}{x+1}$

$x+1 \overline{)\,x^4+x^3+x^2+x+1}$

$x^3 + x$

$x^4 + x^3$

$x^2 + x + 1$

$x^2 + x$

1

Divide: $8x^3-6x^2+2x-5$ by $4x^2-x-1$

$2x - 1$

$4x^2-x-1 \overline{)\,8x^3-6x^2+2x-5}$

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

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

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

$3x-6$

$8x^3-6x^2+2x-5 = (4x^2-x-1)(2x-1) + 3x-6$

Divide: $3x^4-6x^3+9x^2-5x+8$ by x^2+x-3

$3x^2 - 9x + 27$

$x^2+x-3 \overline{)\,3x^4-6x^3+9x^2-5x+8}$

$3x^4 + 3x^3 - 9x^2$

$-9x^3 + 18x^2 - 5x + 8$

$-9x^3 - 9x^2 + 27x$

$27x^2 - 32x + 8$

$27x^2 + 27x - 81$

$-59x + 89$

Divide: $10x^4+8x^3-9x^2+7x-3$ by x^2+x-3

$10x^2 - 2x + 23$

$x^2+x-3 \overline{)\,10x^4+8x^3-9x^2+7x-3}$

$10x^4 + 10x^3 - 30x^2$

$-2x^3 + 21x^2 + 7x - 3$

$-2x^3 - 2x^2 - 6x$

$23x^2 + 13x - 3$

$23x^2 + 23x - 69$

$-10x + 66$

2. Determine the value of "k" such that when $2x^3+9x^2+kx-15$ is divided by $x+5$, the remainder is 0.

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

$x+5 \overline{)\,2x^3+9x^2+kx-15}$

$2x^3 + 10x^2$

$-x^2 + kx - 15$

$-x^2 + 5x$

$(k-5)x - 15$

$(k-5)x + (k-5)5$

$-15 - 5k + 25$

$R = -15 - 5k + 25$

$10 - 5k = 0$

$k = 2$

3. When $2x^2+x-7$ is divided by $ax+b$, the quotient is $2x+5$ and the remainder is 3. What are the values of "a" and "b"?

$(2x+5)(ax+b) + 3 = 2x^2 + x - 7$

3. When $2x^2+x-7$ is divided by $ax+b$, the quotient is $2x+5$ and the remainder is 3. What are the values of "a" and "b"?

$(2x+5)(ax+b)+3 = 2x^2+x-7$

$2ax^2+5ax+2bx+5b+3 = 2x^2+x-7$

$2ax^2+(5a+2b)x+(5b+3) = 2x^2+x-7$

$2a=2$ $\quad$ $5b+3=-7$

$a=1$ $\quad$ $5b=-10$ $\quad$ $b=-2$

4. If ax^2+bx+1 is divided by $2x-3$, the remainder is 0. What is the value of $3a+2b$?

$\frac{ax^2+bx+1}{(2x-3)} \Rightarrow$ remainder is 0.

$\rightarrow x=\frac{3}{2}$

$ax^2+bx+1=(2x-3)(mx-n)$

$a\left(\frac{3}{2}\right)^2+b\left(\frac{3}{2}\right)+1=0$

$\frac{4}{3}\times\left[\frac{9a}{4}+\frac{3b}{2}\right]=(-1)\times\frac{4}{3}$

$3a+2b=-\frac{4}{3}$

5. Given the expression: $2x^3-3x^2-8x-3$, which of the following will give a remainder of 0 when divided by it: $x+1$, $x-1$, or $x-3$?

$f(-1)=2(-1)^3-3(-1)^2-8(-1)-3$

$=-2-3+8-3=-8+8=0$

$f(1)=2(1)^3-3(1)^2-8(1)-3$

$=2-3-8-3=-12\neq 0$

$f(3)=2(3)^3-3(3)^2-8(3)-3$

$=54-27-24-3=0$

Ans: $(x+1)$ and $x-3$

6. When x^2-3x+k is divided by $x-k$, the remainder is "k". Find all the possible value(s) of "k".

$\frac{x^2-3x+k}{(x-k)}=$, $R=k$

$x-k=0$

$x=k$

$x^2-3x+k=$ Remainder

$k^2-3k+k=k$

$k^2-3k=0$

$k(k-3)=0$

$k=0$, $k=3$

7. Divide and find the quotient for each of the following. Then factor the quotient.

8. Given that $x^3 - x^2 - 24x - 36 = (x+3)(x+A)(x+B)$. What are the values of "A" and "B"?

$$\begin{array}{r|rrrr} -3 & 1 & -1 & -24 & -36 \\ & & -3 & 12 & 36 \\ \hline & 1 & -4 & -12 & 0 \end{array}$$

$x^2 - 4x - 12 = (x+A)(x+B)$

$(x-6)(x+2) = (x+A)(x+B)$

$(A,B) = (-6,2)$ or $(2,-6)$

9. Given that $6x^3 - 11x^2 - 4x + 4 = (x-2)(2x+A)(3x+B)$. What are the values of "A" and "B"?

SHOULD BE A "2"

$x - 2 = 0$ $\quad 2x + A = 0$ $\quad 3x + B = 0$

$x = 2$ $\quad 2(2) + A = 0$ $\quad 3(2) + B = 0$

$A = -4$ $\quad B = -6$

10. When the dividend $ax^3 + bx^2 + 4x - 8$ is divided by $x^2 - x - 2$, the remainder is $15x + 2$. Find the values of "a" and "b".

$ax^3 + bx^2 + 4x - 8 = (x^2 - x - 2)(\quad) + 15x + 2$

$ax^3 + bx^2 - 11x - 10 = (x+1)(x-2)(\quad)$

$\frac{ax^3 + bx^2 - 11x - 10}{x+1} \Rightarrow R = 0$ $\quad$ $\frac{ax^3 + bx^2 - 11x - 10}{x-2} \Rightarrow R = 0$

$a(-1)^3 + b(-1)^2 - 11(-1) - 10 = 0$ $\quad$ $a(2)^3 + b(2)^2 - 11(2) - 10 = 0$

11. When the dividend $ax^3 + bx^2 - 53x - 8$ is divided by $x^2 - 5x - 6$, the remainder is $48x - 86$. Find the values of "a" and "b".

$ax^3 + bx^2 - 53x - 8 = (x^2 - 5x - 6)(\quad) + 48x - 86$

$ax^3 + bx^2 - 53x - 8 = (x-2)(x-3)(\quad) + 48x - 86$

$ax^3 + bx^2 - 53x - 8 - 48x + 86 = (x-2)(x-3)(\quad)$

$ax^3 + bx^2 - 101x + 78 = (x-2)(x-3)(\quad)$

$\frac{ax^3 + bx^2 - 101x + 78}{(x-2)} \Rightarrow R = 0$ $\quad$ $\frac{ax^3 + bx^2 - 101x + 78}{(x-3)} \Rightarrow R = 0$

$a(2)^3 + b(2^2) - 101(2) + 78 = 0$ $\quad$ $a(3)^3 + b(3^2) - 101(3) + 78 = 0$

$8a + 4b - 202 + 78 = 0$ $\quad$ $27a + 9b - 303 + 78 = 0$

$8a + 4b - 124 = 0$ $\quad$ $27a + 9b - 225 = 0$

$2a + b - 31 = 0$ $\quad$ $3a + b - 25 = 0$

$3 \times [\ 2a + b - 31 = 0$

$2 \times [\ 3a + b - 25 = 0$

$6a + 3b - 93 = 0$

$6a + 2b - 50 = 0$

$b - 43 = 0$ $\quad b = 43$

$-6a + 2b = 31$

$b - 43 = 0$ $\quad$ $b = 43$

$2a + 43 - 31 = 0$

$2a = 31 - 43$

$2a = -12$ $\quad$ $a = -6$

$ax^3 + bx^2 - 53x - 8 \quad \div \quad x^2 - 5x - 6 \implies R = 48x - 86$

$ax^3 + bx^2 - 53x - 8 = (x-6)(x+1)(\,?\,) + 48x - 86$

$ax^3 + bx^2 - 101x + 78 = (x-6)(x+1)(\,?\,) + ??$

$x = 6$: $a(6)^3 + b(6)^2 - 101(6) + 78 = 0$ $\quad$ $x = -1$: $-a + b + 101 + 78 = 0$

$216a + 36b = 606 - 78$ $\quad$ $-a + b = -179$

$216a + 36b = 528$