Name:_________________________________ Date:___________

PC: More Polynomial Practice Ms. Loughran

1. If $f(-6)=0$, then $x+6$ is a factor of $f(x)$.

2. If $3x-2$ is a factor of $f(x)$, then $\frac{2}{3}$ is a zero of $f(x)$.

3. If $f(x)=(5x-2)(2x+1)(3x-1)$, then the zeros of $f(x)$ are: $\frac{2}{5}, \frac{-1}{2}, \frac{1}{3}$

4. If $f(7)=0$, then a factor of $f(x)$ is: $x-7$

5. If $3x-4$ is a factor of $f(x)$, then $f(\frac{4}{3})=0$

6. Show in 2 ways that $x+1$ is a factor of x^3-x^2-5x-3.

S.D.

$$\begin{array}{r|rrrr} -1 & 1 & -1 & -5 & -3 \\ & & -1 & 2 & 3 \\ \hline & 1 & -2 & -3 & 0 \end{array}$$

OR LD

Plug in $(-1)^3-(-1)^2-5(-1)-3=0$

7. Show 2 ways that $x-3$ is a factor of x^5-243.

SD

$$\begin{array}{r|rrrrrr} 3 & 1 & 0 & 0 & 0 & 0 & -243 \\ & & 3 & 9 & 27 & 81 & 243 \\ \hline & 1 & 3 & 9 & 27 & 81 & 0 \end{array}$$

OR Long Div.

Plugin $(3)^5-243=0$

8. Factors of x^3+2x^2-5x-6 are $(x-2),(x+3)$ and $(x+1)$. What are the zeros of the polynomial?

$\{2,-3,-1\}$

9. Given the zeros of $x^3 - 3x^2 - 18x + 40$ are 2, - 4, and 5. What are the factors of the polynomial? Check by multiplication.

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

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

$x^3+2x^2-8x-5x^2-10x+40$

$x^3-3x^2-18x+40$

10. Show that -4 is a zero of $f(x) = x^3 + 6x^2 + 11x + 12$.

$f(-4) = (-4)^3 + 6(-4)^2 + 11(-4) + 12$

$= -64 + 96 - 44 + 12 = 0$

OR

Syn. Div. or Long Division

to show remainder $= 0$

11. Given that $(x+1)$ is a factor of $f(x) = 3x^3 - 7x^2 - 18x - 8$ find all zeros of $f(x)$.

-1	3	-7	-18	-8
		-3	10	8
	3	-10	-8	0

$(x+1)(3x^2-10x-8) = 0$

$(x+1)(3x^2-12x+2x-8) = 0$

$(x+1)[3x(x-4)+2(x-4)] = 0$

$0 = (x+1)(x-4)(3x+2)$

$x = 4, -1, -\frac{2}{3}$

12. One root of $2x^3+7x^2-33x-18=0$ is -6. Find the complete solution set of this equation.

$$\begin{array}{r|rrrr} -6 & 2 & 7 & -33 & -18 \\ & & -12 & 30 & 18 \\ \hline & 2 & -5 & -3 & 0 \end{array}$$

$(x+6)(2x^2-5x-3)=0$

$(x+6)[2x^2-6x+x-3]=0$

$(x+6)[2x(x-3)+1(x-3)]$

$(2x+1)(x-3)(x+6)=0$

$x=-\frac{1}{2}, 3, -6$

13. Show that $(x+2)$ is a factor of $x^3+3x^2+4x+4=0$. Use this information to find the solution set of this equation.

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

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

$x=-2$

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

$x=\frac{-1\pm\sqrt{-7}}{2}=\frac{-1\pm i\sqrt{7}}{2}$

$\left\{-2, \frac{-1\pm i\sqrt{7}}{2}\right\}$

$\rightarrow (2x-1)$ factor

14. One zero of $2x^3-3x^2-23x+12$ is $\frac{1}{2}$. Find the complete **factorization** of this polynomial and find the remaining zeros. (**THE COMPLETE FACTORIZATION OF A POLYNOMIAL WILL INCLUDE FACTORS WITH ONLY INTEGRAL COEFFICIENTS.)**

$$\begin{array}{r|rrrr} \frac{1}{2} & 2 & -3 & -23 & 12 \\ & & 1 & -1 & -12 \\ \hline & 2 & -2 & -24 & 0 \end{array}$$

$\underbrace{2 \quad -2 \quad -24}_{\div 2}$

$(2x-1)(x^2-x-12)$

$(2x-1)(x-4)(x+3)$ ← complete factorization

$0=(2x-1)(x-4)(x+3)$

$x=\frac{1}{2}, 4, -3$ remaining zeros: $\{4,-3\}$

15. Find the remainder when $x^{124}-5x^{76}+2x^{45}-3x+5$ is divided by $x+1$.

$(-1)^{124}-5(-1)^{76}+2(-1)^{45}-3(-1)+5 = 1-5-2+3+5 = 2$

16. If $x+3$ is a factor of $f(x)=x^3+4x^2+x-6$, find the complete factorization of $f(x)$.

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

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

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

17. One root of $x^3 + 4x^2 - 4x - 1 = 0$ is 1. Find the other roots.

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

$$(x-1)(x^2+5x+1) = 0$$

$x - 1 = 0$

$x = 1$

$x^2 + 5x + 1 = 0$

$$x = \frac{-5 \pm \sqrt{25 - 4(1)(1)}}{2(1)}$$

$$x = \frac{-5 \pm \sqrt{21}}{2}$$

other roots: $\left\{ \frac{-5 \pm \sqrt{21}}{2} \right\}$