

# HOMEWORK:

## SYNTHETIC SUBSTITUTION, MODELING

NAME: \_\_\_\_\_ DAY 3 DUE: \_\_\_\_\_

Evaluate with synthetic substitution.

1.  $f(x) = 3x^4 - x^3 - 3x + 10$  for  $x = 2$

$$\begin{array}{r|rrrrrr} 2 & 3 & -1 & 0 & -3 & 10 \\ & \downarrow & 6 & 10 & 20 & 34 \\ \hline & 3 & 5 & 10 & 17 & 44 \end{array}$$

$$f(2) = 44$$

$$(2, 44)$$

2.  $f(x) = 4x^3 - 2x^2 - 14x + 30$  for  $x = -3$

$$\begin{array}{r|rrrr} -3 & 4 & -2 & -14 & 30 \\ & \downarrow & -12 & 42 & -84 \\ \hline & 4 & -14 & 28 & -54 \end{array}$$

$$f(-3) = -54$$

$$(-3, -54)$$

### Given Factors, Identify the Zeros

3.  $(x-2)(x-5)$  2, 5

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

5.  $3x(x+1)$  0, -1

6.  $2x^4(x+10)$  0, -10

7.  $(2x-5)(4x+1)$   $\frac{5}{2}, -\frac{1}{4}$   
 $2x-5=0 \quad 4x+1=0$   
 $x=\frac{5}{2} \quad x=-\frac{1}{4}$

### Given a List of Zeros, write as a List of Factors

8. 2  $(x-2)$

9.  $x = -5$   $(x+5)$

10.  $x = 4, -3$   $(x-4)(x+3)$

11.  $x = \pm 8$   $(x+8)(x-8)$

12.  $x = \pm 4\sqrt{3}$   $(x^2-48)$

13.  $x = \frac{3}{5}$   $(5x-3)$   
 $x - \frac{3}{5} = 0$

14.  $x = -\frac{5}{3}$   $(3x+5)$   
 $x + \frac{5}{3} = 0$

15.  $x = -\frac{1}{5}, 3$   $(5x+1)(x-3)$   
 $x + \frac{1}{5} = 0$   
 $5x + 1 = 0$

$x - 4\sqrt{3} = 0$   
 $x^2 = (4\sqrt{3})^2$   
 $x^2 = 16 \cdot 3$   
 $x^2 = 48$   
 $x^2 - 48 = 0$

Given one zero, find another other zero.

16.  $x = 3 + 2i$       $3 - 2i$

17.  $x = 2 - \sqrt{7}$       $2 + \sqrt{7}$

18.  $x = \sqrt{15}$       $-\sqrt{15}$

19.  $x = -3i$       $+3i$

20. Write the polynomial function (in factored form) with leading coefficient 1 and the following zeros:  $-2, 4, 5$

$f(x) = 1(x+2)(x-4)(x-5)$       $\rightarrow$  factored form

$f(x) = (x^2 + 2x - 4x - 8)(x - 5)$

$f(x) = (x^2 - 2x - 8)(x - 5)$

$f(x) = x^3 - 5x^2 - 2x^2 + 10x - 8x + 40$

$f(x) = x^3 - 7x^2 + 2x + 40$

21. Write the polynomial function (in standard form) with leading coefficient 2 and the following zeros:  $10, 3i$

$f(x) = 2(x-10)(x+3i)(x-3i)$

$f(x) = 2(x-10)(x^2 + 3i - 3i + 9i^2)$

$f(x) = 2(x-10)(x^2 - 9)$

$f(x) = 2(x^3 - 10x^2 - 9x + 90)$

$f(x) = 2x^3 - 20x^2 - 18x + 180$

22. Write the polynomial function (in standard form) with leading coefficient 2 and the following zeros:  $5, -2 + \sqrt{3}$

$f(x) = 2(x-5)(x - (-2 - \sqrt{3}))(x + (-2 - \sqrt{3}))$

$f(x) = 2(x-5)(x+2+\sqrt{3})(x-2-\sqrt{3})$

$f(x) = 2(x-5)(x^2 - 2x - x\sqrt{3} + 2x - 4 - 2\sqrt{3} + x\sqrt{3} - 2\sqrt{3} - \sqrt{3}\sqrt{3})$

$f(x) = 2(x-5)(x^2 - 4\sqrt{3} - 4 - 3)$

$f(x) = 2(x-5)(x^2 - 4\sqrt{3} - 7)$

$f(x) = 2(x^3 - 4x\sqrt{3} - 7x - 5x^2 + 20\sqrt{3} - 35)$

$f(x) = 2x^3 - 8x\sqrt{3} - 14x - 10x^2 + 40\sqrt{3} - 70$