

*Key*

1.  $y = \frac{1}{2}(x-1)^2 + 2$   
 Z:  $1 \pm \sqrt{1}$  NO Real Roots  
 V: (1, 2)

2.  $y = x^2 + 24x + 75$   
 $y = (x^2 + 24x + 12^2) + 75 - 144$   
 $y = (x+12)^2 - 69$   
 V: (-12, -69)  
 Z: ~~25~~  $-12 \pm \sqrt{69}$   
 y-int: 75

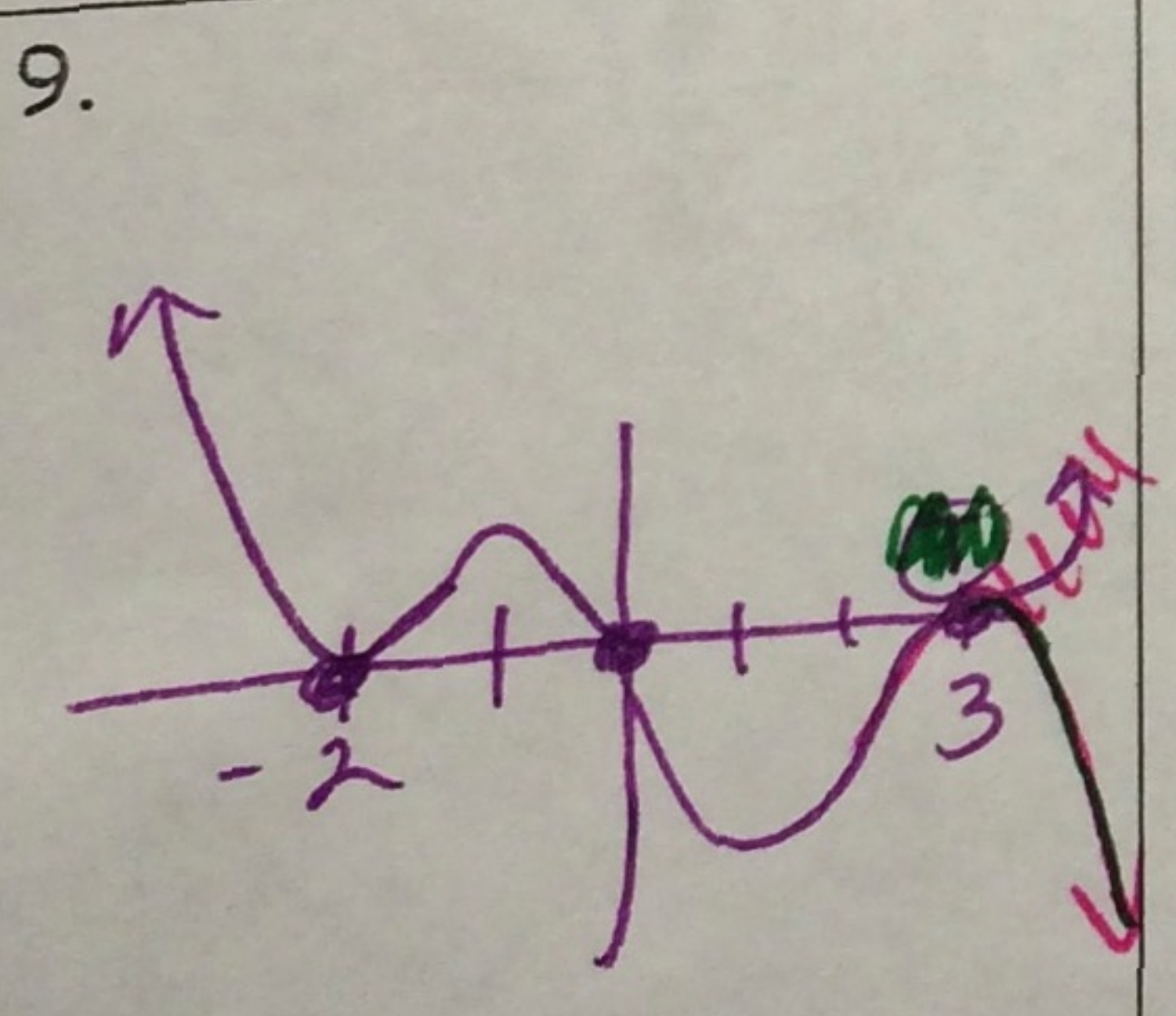
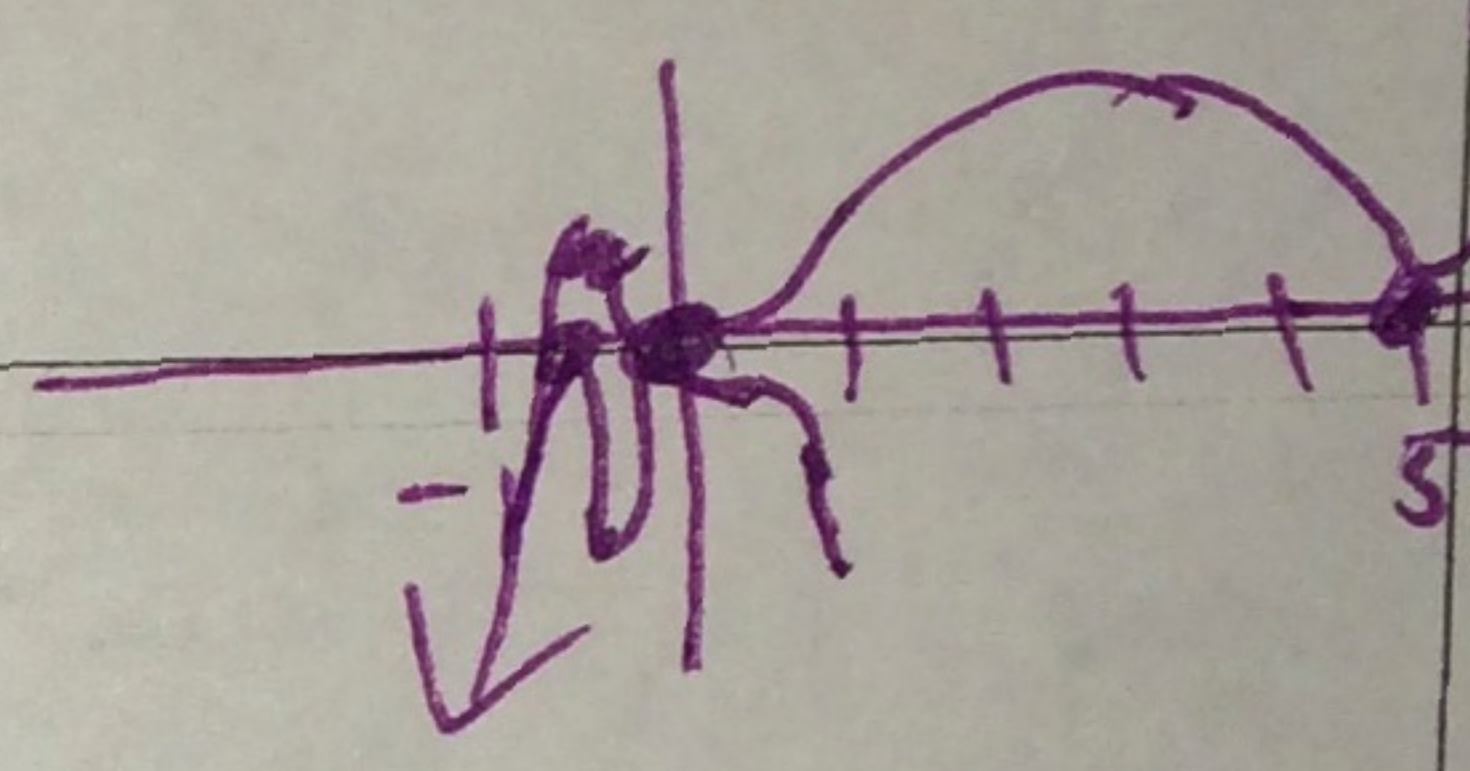
3. V: (-1, -4)  
 Pt (3, -52)  
 $-52 = a(3+1)^2 - 4$   
 $-48 = a(16)$   
 $-3 = a$   
 $y = -3(x+1)^2 - 4$

4.  $f(x) = \frac{1}{2}(x+1)^2 - 3$   
 $0 = \frac{1}{2}(x+1)^2 - 3$   
 $3 = \frac{1}{2}(x+1)^2$   
 $6 = (x+1)^2$   
 $\pm\sqrt{6} = (x+1)$   
 $x = -1 \pm \sqrt{6}$

5.  $f(x) = -3x^2 + 12x - 3$   
 $x = \frac{-b}{2a} = \frac{-12}{2(-3)} = \frac{-12}{-6} = 2$   
 $y = -3(2)^2 + 12(2) - 3$   
 $y = 9$   
 V: (2, 9)  
 $y = -3(x-2)^2 + 9$

6.  $f(x) = (x+5)^2(x+2)^2$   
 $-(x-1)(x-4)$

7.  $y = x^3(x+4)^2(x-3)$   
 Degree: 6  
 # Real Ext: 3



10.  $f(x) = x^3 - 11x^2 + 24x$   
 $= x(x^2 - 11x + 24)$   
 $= x(x-3)(x-8)$

11. Real Roots: 2  
~~Real~~ Relative Ext: 3  
2 Complex roots

12. # Real Roots: 2  
 # Real Extrema: 2  
 Mult. of 3 has no change in direction and counts as 1 root. Mult. 2 counts as 1 root.

13. Max # Roots: 7  
 Max # Rel. Ext: 6  
 End Behavior:  $\downarrow \uparrow$   
 $x \rightarrow -\infty, y \rightarrow -\infty$   
 $x \rightarrow \infty, y \rightarrow \infty$

14. Even " "  $\downarrow \downarrow$

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

16.



Station 2 Use a GRAPHING CALCULATOR

Name

Key

1. Is  $x+1$  a factor of  $2x^3 + 5x + 7$ , explain why or why not.

$$\begin{array}{r|rrrr} -1 & 2 & 0 & 5 & 7 \\ & -2 & 2 & -7 & \\ \hline & 2 & -2 & 7 & 0 \end{array}$$

Yes, the Remainder is zero.

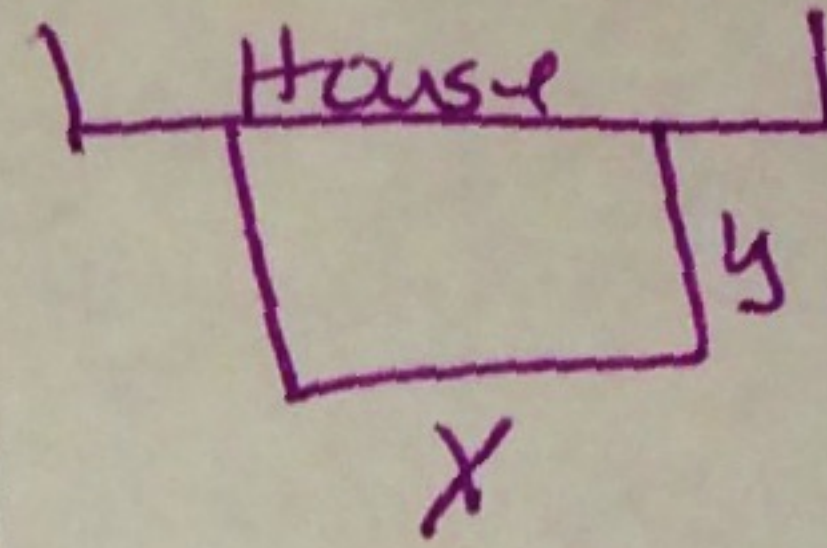
2. Is  $-3i$  a root of  $5x^3 - 2x^2 + 45x - 18$ , explain why or why not.

$$\begin{array}{r|rrrr} -3i & 5 & -2 & 45 & -18 \\ & -15i & (45+6i) & +18 & \\ \hline & 5 & (-2-15i) & 6i & 0 \end{array}$$

yes

$$-3i(-2-15i) = 6i + 45$$

3. Ma Kettle is making a rectangular playground for her 12 children. She only has 80 feet of fencing, so she plans to use one side of the house as the playground (don't put fence on the house). Help her out by determining the dimensions the playground should be, so she can have the maximum area.

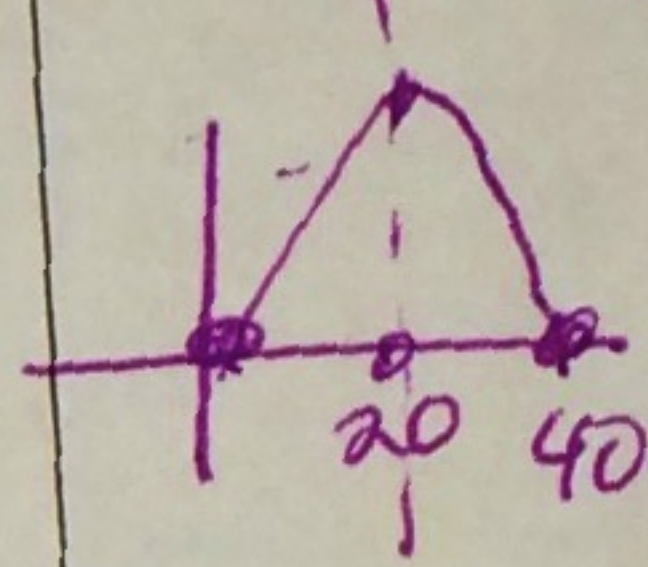


$$A = x \cdot y$$

$$A = y(80 - 2y)$$

$$x + 2y = 80$$

$$x = 80 - 2y$$



Dim:  $40 \times 20$   $A = 800 \text{ ft}^2$

What is the SMALLEST DEGREE polynomial with the given roots. Write the conjugates, if any.

4.  $-7, \frac{1}{12}, 2-3i$   
 $2+3i$

(4)

PRR- Possible Rational Roots. Cross out the roots that CANNOT be a root of the polynomial.

8.  $P(x) = 7x^5 - 4x^4 + x^2 - 2x + 4$   $\frac{1, 2, 4}{1, 7}$

<del>1/7</del>	<del>1/2</del>	<del>1/4</del>	<del>7/4</del>	4
<del>-4/7</del>	-1	<del>√7</del>	<del>-14</del>	-2/7

5.  $-\frac{8}{5}, 1-6i, i, -2i$   
 $1+6i, -i, 2i$

(7)

9.  $P(x) = 5x^5 - 4x^4 + x^2 - 2x - 2$   $\frac{1, 2}{1, 5}$

<del>2/5</del>	<del>1/2</del>	<del>1/5</del>	<del>1/5</del>	1
<del>2</del>	<del>√5</del>	<del>10</del>	<del>-4</del>	-2

6.  $5-\sqrt{2}, \frac{1+3i}{2}, 2-\sqrt{7}$

(6)

$5+\sqrt{2}, \frac{1-3i}{2}, 2+\sqrt{7}$

10.  $P(x) = 6x^6 - 4x^4 + x^2 - 2x + 3$   $\frac{1, 3}{1, 2, 3, 6}$

<del>2/3</del>	-1/2	3/2	1/3	<del>1/6</del>
3	-1	<del>1/2</del>	1	<del>1/4</del>

7.  $-1, \frac{3}{5}, 0, 2$

(4)

11.  $P(x) = 7x^5 - 4x^4 + x^2 - 2x + 10$   $\frac{10}{7} \frac{1, 2, 5, 10}{1, 7}$

<del>7/10</del>	<del>1/5</del>	<del>1/5</del>	5/7	2/7
-1/7	-1	-10/7	5	-2

Key

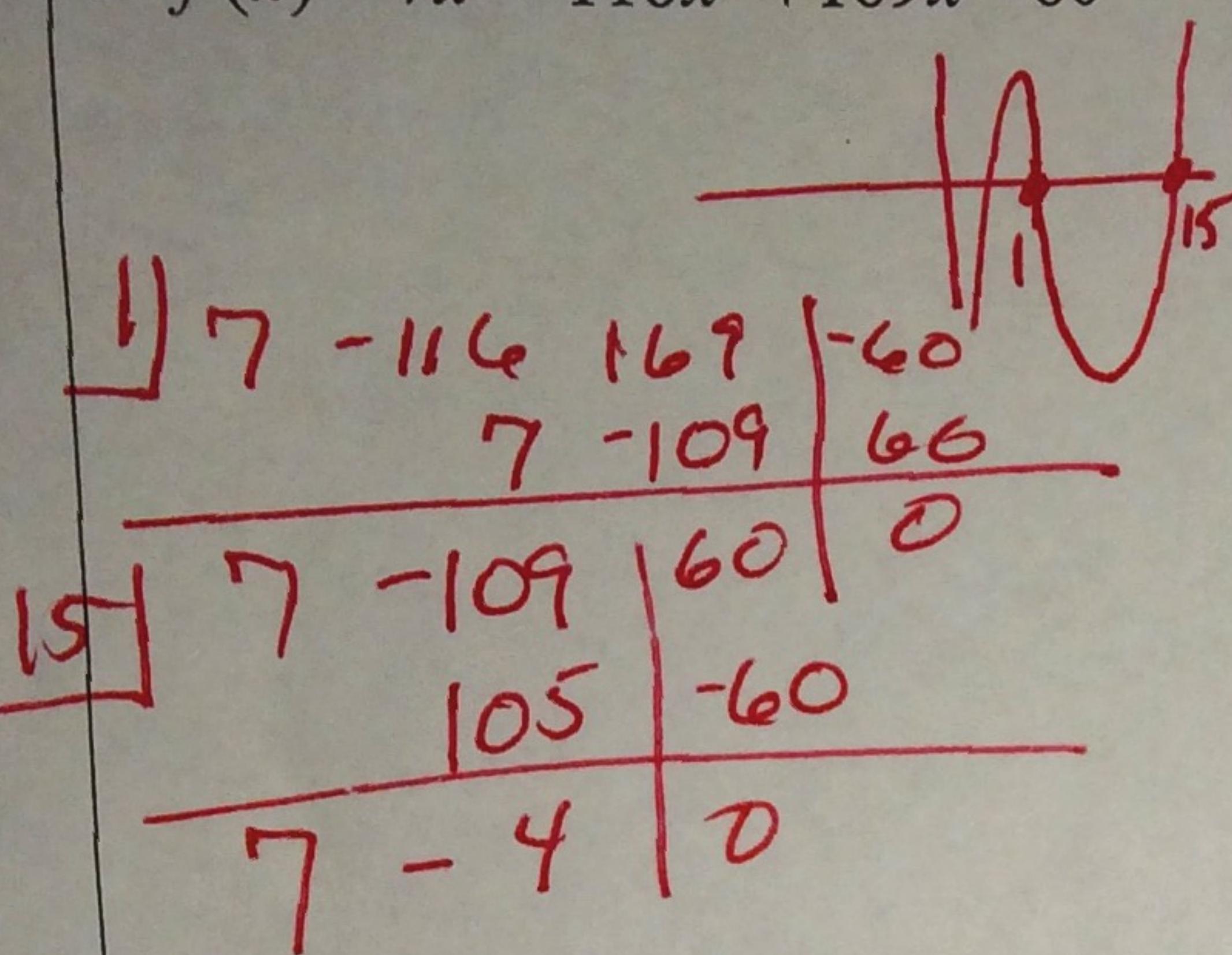


# STATION 3 Test 4.1 Polynomials

Name Key Per \_\_\_\_\_

Find ALL ROOTS. Give exact values and show all work.

1.  $f(x) = 7x^3 - 116x^2 + 169x - 60$



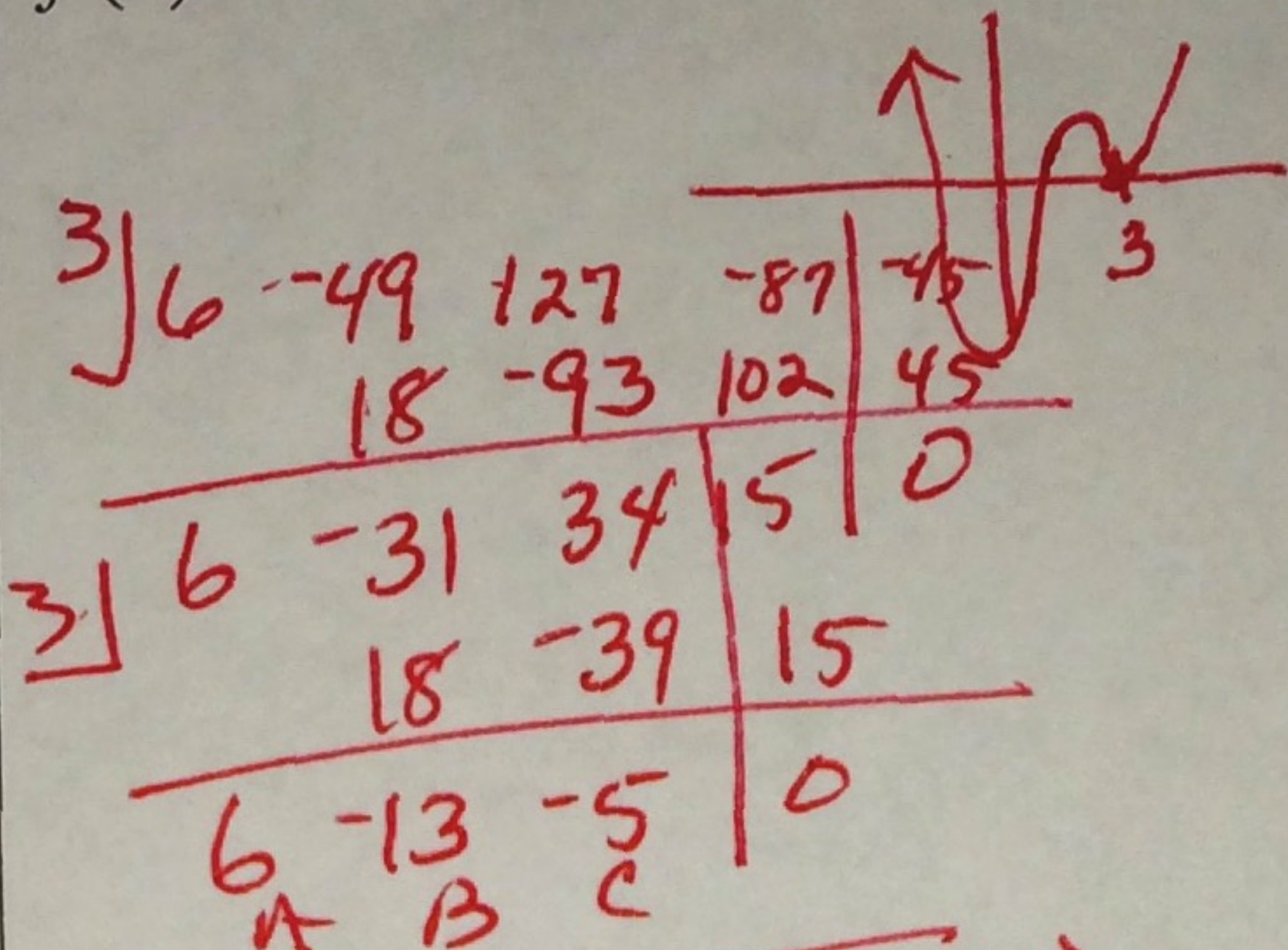
$$\begin{array}{r|rrrr} 1 & 7 & -116 & 169 & -60 \\ & & 7 & -109 & 66 \\ \hline & 7 & -109 & 60 & 0 \\ 15 & & 105 & -60 & \\ \hline & 7 & -4 & 0 & \end{array}$$

$$7x - 4 = 0$$

$$x = \frac{4}{7}$$

Roots:  
1, 15,  $\frac{4}{7}$

2.  $f(x) = 6x^4 - 49x^3 + 127x^2 - 87x - 45$



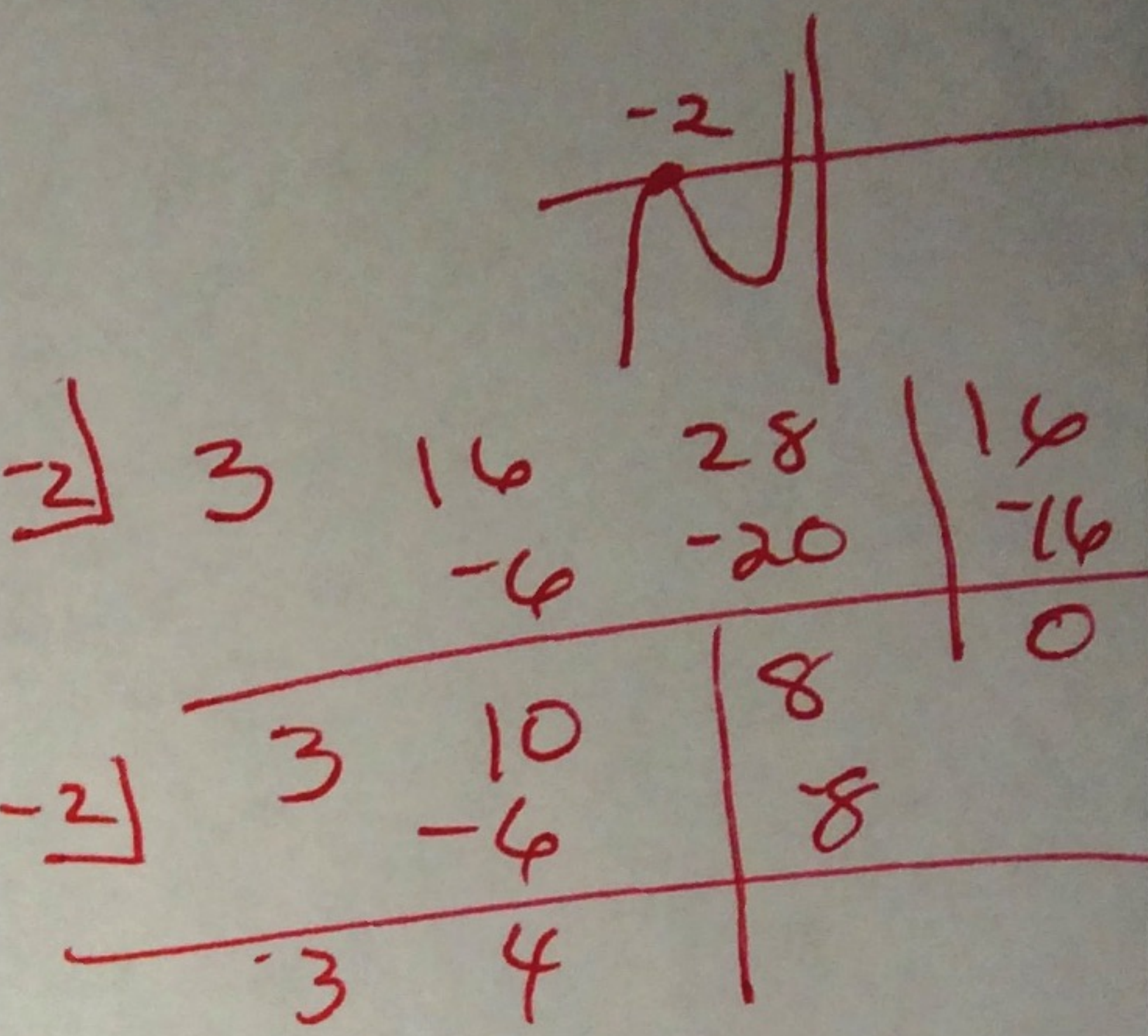
$$\begin{array}{r|rrrrr} 3 & 6 & -49 & 127 & -87 & -45 \\ & & 18 & -93 & 102 & 45 \\ \hline & 6 & -31 & 34 & 15 & 0 \\ 3 & & 18 & -39 & 15 & \\ \hline & 6 & -13 & -5 & 0 & \end{array}$$

$$x = \frac{13 \pm \sqrt{(-13)^2 - 4(6)(-5)}}{2(6)}$$

$$x = \frac{13 \pm \sqrt{289}}{12} = \frac{13 \pm 17}{12} = \frac{13 \pm 17}{12}$$

Roots  
3,  $\frac{5}{2}$ ,  $-\frac{1}{3}$   
(double)

3.  $f(x) = 3x^3 + 16x^2 + 28x + 16$



$$\begin{array}{r|rrrr} -2 & 3 & 16 & 28 & 16 \\ & & -6 & -20 & -16 \\ \hline & 3 & 10 & 8 & 0 \\ -2 & & 3 & -4 & 8 \\ \hline & 3 & 4 & 8 & \end{array}$$

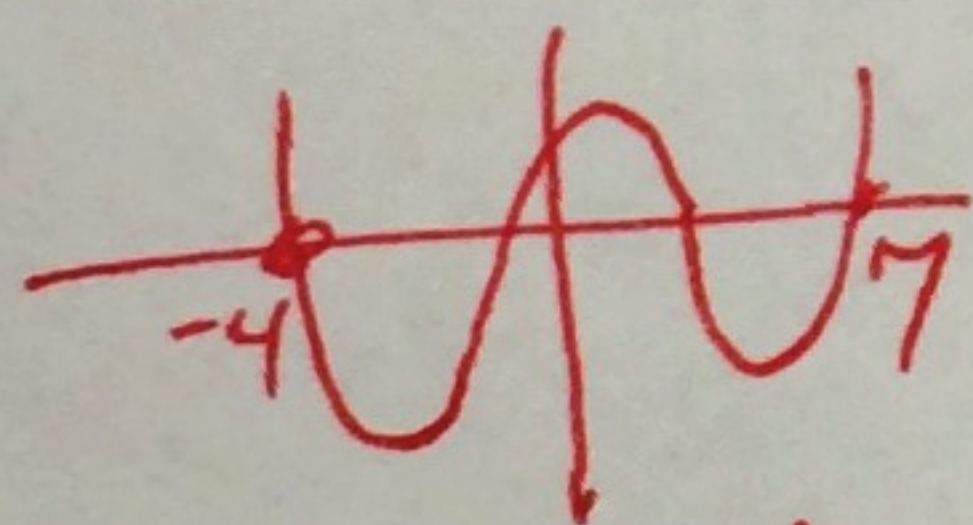
$$3x + 4 = 0$$

$$x = -\frac{4}{3}$$

Roots: -2,  $-\frac{4}{3}$   
(double)

Find ALL ROOTS. Give exact values and show all work.

4.  $f(x) = x^4 - 7x^3 - 17x^2 + 115x + 28$



$$\begin{array}{r|rrrrr} -4 & 1 & -7 & -17 & 115 & 28 \\ & & -4 & 44 & -108 & -28 \\ \hline & 1 & -11 & 27 & 7 & 0 \\ 7 & & 7 & -28 & -7 & \\ \hline & 1 & -4 & -1 & 0 & \end{array}$$

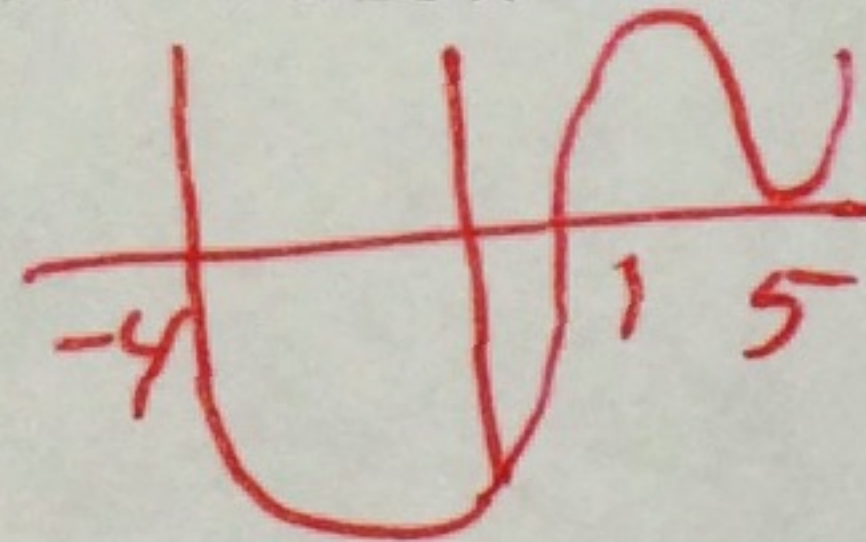
$$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(-1)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{20}}{2} = \frac{4 \pm 2\sqrt{5}}{2}$$

$$x = 2 \pm \sqrt{5}$$

Roots:  
-4, 7,  $2 \pm \sqrt{5}$

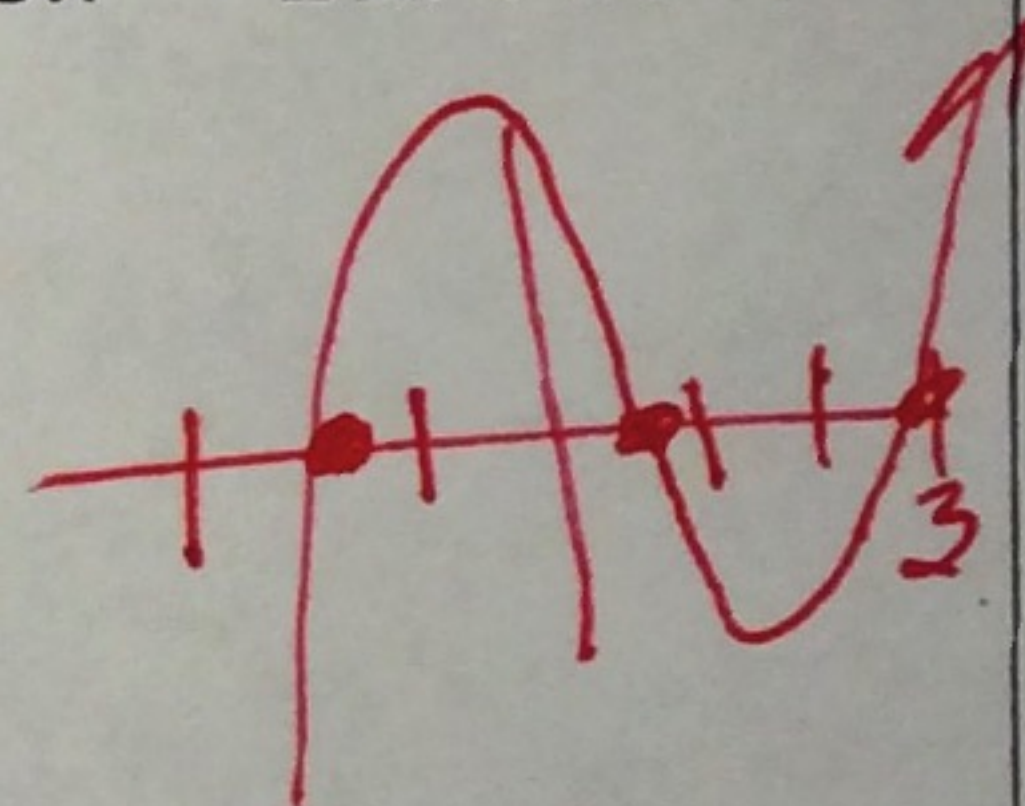
5.  $f(x) = x^4 - 7x^3 - 9x^2 + 115x - 100$



Roots:

-4, 1, 5  
(double)

6.  $f(x) = 6x^3 - 13x^2 - 21x + 18$



$$\begin{array}{r|rrrr} 3 & 6 & -13 & -21 & 18 \\ & & 18 & 15 & -18 \\ \hline & 6 & 5 & -6 & 0 \\ & A & B & C & \end{array}$$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(6)(-6)}}{2(6)}$$

$$x = \frac{-5 \pm \sqrt{169}}{12} = \frac{-5 \pm 13}{12}$$

Roots:

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

$$-\frac{5+13}{12}, -\frac{5-13}{12}$$