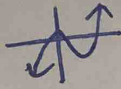


MATH 3 HW - FINDING ROOTS OF LARGER POLYNOMIALS

NAME _____

Sketch a graph of the function. Find all roots. SHOW ALL WORK.

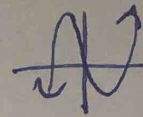
1. $x^3 - 8x^2 + 7x = 0$



Calc table: (0,0)
(1,0)
(7,0)

Roots:
 $x = 0, 1, 7$

2. $x^3 + 4x^2 - 18x = 0$



Calc table: (0,0)

$$\begin{array}{r|rrrr} 0 & 1 & 4 & -18 & 0 \\ + \downarrow & & 0 & 0 & 0 \\ \hline & 1 & 4 & -18 & 0 \end{array}$$

$x^2 + 4x - 18 = 0$

$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(-18)}}{2(1)}$

$x = \frac{-4 \pm \sqrt{88}}{2}$

$x = \frac{-4 \pm 2\sqrt{22}}{2}$
reduce!

Roots:
 $x = 0, 2 \pm \sqrt{22}$

3. $x^4 + 7x^2 - 8 = 0$



Calc table: (1,0)
(-1,0)

$$\begin{array}{r|rrrrr} 1 & 1 & 0 & 7 & 0 & -8 \\ + \downarrow & & 1 & 1 & 8 & 8 \\ \hline & 1 & 1 & 8 & 8 & 0 \end{array}$$

$x^2 + 8 = 0$

$x^2 = -8$
 $x = \pm i\sqrt{8}$

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

$$\begin{array}{r|rrrr} -1 & 1 & 1 & 8 & 8 \\ + \downarrow & & -1 & 0 & -8 \\ \hline & 1 & 0 & 8 & 0 \end{array}$$

Roots:
 $x = -1, 1, \pm 2i\sqrt{2}$

4. $x^3 - x^2 + 4x - 4 = 0$

Calc table: (1,0)

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

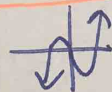
$x^2 + 4 = 0$

$x^2 = -4$

$x = \pm 2i$

Roots:
 $x = 1, \pm 2i$

5. $f(x) = 3x^3 - 5x^2 - 11x - 3$



Calc table: (-1,0)
(3,0)

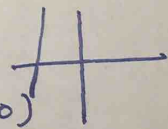
$$\begin{array}{r|rrrr} 1 & 3 & -5 & -11 & -3 \\ + \downarrow & & -3 & 8 & 3 \\ \hline & 3 & -8 & -3 & 0 \end{array}$$

$$\begin{array}{r|rr} 3 & 3 & -8 & -3 \\ + \downarrow & & 9 & 3 \\ \hline & 3 & 1 & 0 \end{array}$$

$3x + 1 = 0$
 $3x = -1$
 $x = -1/3$

Roots:
 $x = -1, 3, -1/3$

6. $y = x^3 + 125$



Calc table: (-5,0)

$$\begin{array}{r|rrrr} -5 & 1 & 0 & 0 & 125 \\ + \downarrow & & -5 & 25 & -125 \\ \hline & 1 & -5 & 25 & 0 \end{array}$$

$x^2 - 5x + 25 = 0$

$x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(25)}}{2(1)}$
 $x = \frac{5 \pm 5i\sqrt{3}}{2}$

$x = \frac{5 \pm \sqrt{-75}}{2}$

$x = \frac{5 \pm i\sqrt{75}}{2}$

Roots:
 $x = -5, \frac{5 \pm 5i\sqrt{3}}{2}$