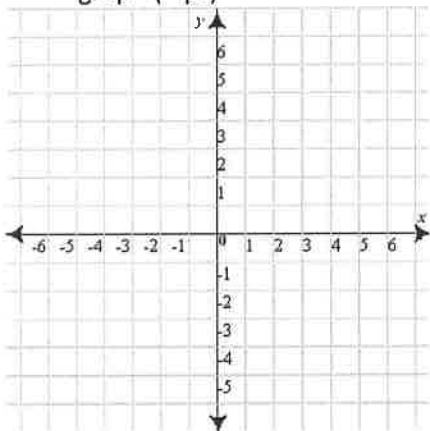**NO GRAPHING CALCULATOR ALLOWED!**

I. Describe the end behavior, the roots, the multiplicity of the roots and then sketch what the graph should look like.
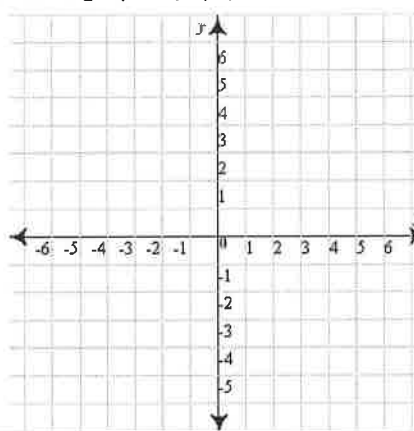
1. $y = x(x-3)^2$	2. $y = -(x+4)^3(x-2)^2(x-5)$

• End behavior (circle answer): (1 pt)
  a) fall/fall   b) rise/rise
  c) fall/rise   d) rise/fall
	• End behavior (circle answer): (1 pt)
	  a) fall/fall b) rise/rise
	  c) fall/rise d) rise/fall

• List roots and the multiplicity of the roots (3 pts)	• List roots and the multiplicity of the roots (3 pts)
• Sketch of graph (1 pt)	• Sketch of graph: (1 pt)

II. Perform the following operations

3. $(2x^3 - 5x^2 + 3) + (3x^2 - 8) - (4x^3 + 2x^2 - 8)$. Then classify by degree and term.	4. Write the polynomial equation in factored form with roots at x = 3, -2, and ¾. All multiplicities are 1.

Solve the following:

5. $x^3 + 64 = 0$	6. $4x^3 - 4x^2 - 3x = 0$	7. $x^4 + 3x^2 - 28 = 0$

NO GRAPHING CALCULATOR ALLOWED!

I. Describe the end behavior, the roots, the multiplicity of the roots and then sketch what the graph should look like.

1. $y = x(x-3)^2$ x^3	2. $y = -(x+4)^3(x-2)^2(x-5)$ $-x^6$
• End behavior (circle answer): (1 pt) a) fall/fall b) rise/rise **(c) fall/rise)** d) rise/fall	• End behavior (circle answer): (1 pt) **(a) fall/fall)** b) rise/rise c) fall/rise d) rise/fall
• List roots and the multiplicity of the roots (3 pts) $x=0$ mult 1 $x=3$ mult 2	• List roots and the multiplicity of the roots (3 pts) $x=-4$ mult 3 $x=2$ mult 2 $x=5$ mult 1
• Sketch of graph (1 pt)	• Sketch of graph: (1 pt)
	wiggle

II. Perform the following operations

3. $(2x^3 - 5x^2 + 3) + (3x^2 - 8) - (4x^3 + 2x^2 - 8)$. Then classify by degree and term.	4. Write the polynomial equation in factored form with roots at x = 3, -2, and ¾. All multiplicities are 1.
$2x^3 -5x^2 +3 +3x^2 -8 -4x^3 -2x^2 +8$ $-2x^3 - 4x^2 + 3$ **Cubic Trinomial**	$x-3=0$ $x+2=0$ $x=\frac{3}{4}$ $4x-3=0$ $y = (x-3)(x+2)(4x-3)$

Solve the following:

5. $x^3 + 64 = 0$	6. $4x^3 - 4x^2 - 3x = 0$	7. $x^4 + 3x^2 - 28 = 0$
$(x+4)(x^2-4x+16)=0$ $x=-4$ $x^2 - 4x + \boxed{4} = -16 + \boxed{4}$ $(x-2)^2 = -12$ $x-2 = \pm 2i\sqrt{3}$ $x = 2\pm 2i\sqrt{3}$ $\{-4, 2\pm 2i\sqrt{3}\}$	$x(4x^2-4x-3)=0$ -12 $x[4x^2 - 6x + 2x - 3]=0$ $\frac{-6}{-4}$ $\frac{2}{4}$ $x[2x(2x-3)+1(2x-3)]$ $x(2x-3)(2x+1)=0$ $\{0, \frac{3}{2}, -\frac{1}{2}\}$	$(x^2+7)(x^2-4)=0$ $(x^2+7)(x-2)(x+2)=0$ $x^2 = -7$ $x=2$ $x=-2$ $x = \pm i\sqrt{7}$ $\{2, -2, i\sqrt{7}, -i\sqrt{7}\}$