Name:_____

1) Find the linear factorization of $x^2 + 8x + 12$.
$$(x + 6)(x + 2)$$

2) Given a 6th degree polynomial with complex root $x = -4i$, how many real roots could it have?
0 real & 6 imaginary or 2 real & 4 imaginary or 4 real & 2 imaginary

3) Find the linear factorization of $2x^2 - 7x - 15$.
$$(2x + 3)(x - 5)$$

4) Find the linear factorization of $10x^3 + 25x^2 + 40x + 100$, given that $x - 2i$ is a factor.
5(2x + 5)(x-2i)(x + 2i)

5) How many complex factors does the polynomial $x^5 + 4x^3 - 8x^2$ have?
2

6) List the possible rational roots of $x^4 - 8x^2 + 12$ using the rational roots theorem.
$\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

7) List the possible rational roots of $3x^4 + 5x^3 - 2x + 6$ using the rational roots theorem.
$$\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{3}, \pm \frac{2}{3}$$

8) Given $x = 2i$ is a complex root of $x^3 + 3x^2 + 4x + 12$ what are the remaining roots?

-2i, -3

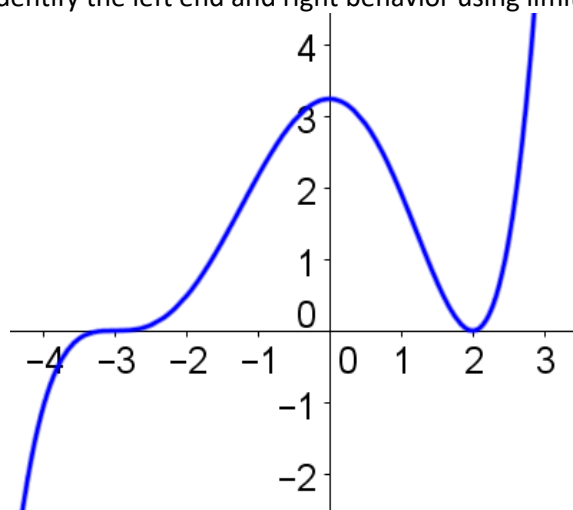9) Sketch the graph below that represents the function, $f(x) = (x + 3)^2(x - 1)(x + 4)$?
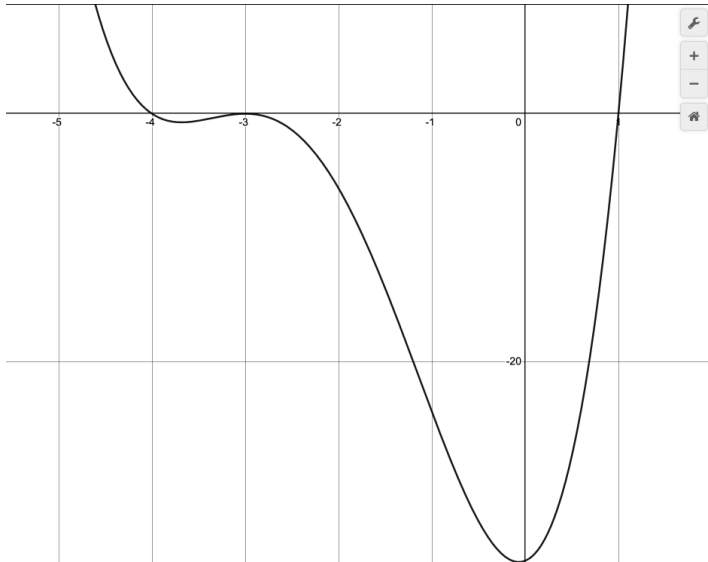
10) Describe the roots with multiplicities of the function below.
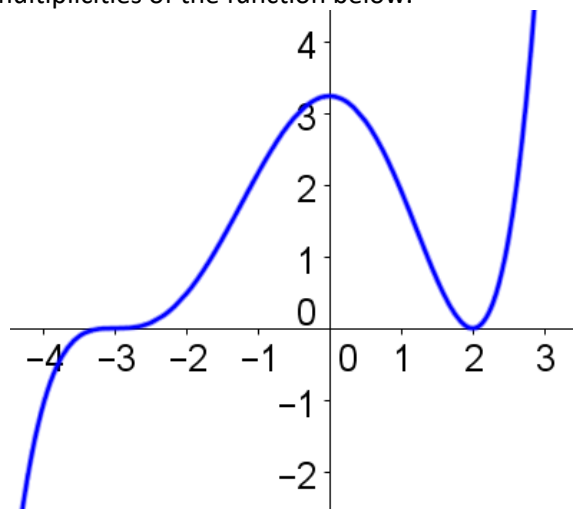
$-3\ w.\,m.\,of\ 3\ \&$

2 w. m of 2

11) Given the graph below, identify the left end and right behavior using limit notation.

$$\lim_{x \to -\infty} y = \infty$$

$$\lim_{x \to \infty} y = \infty$$

12) Identify the **right** end behavior of the given function of $k(x) = -3(x-4)^2(x+5)^6$

$$\lim_{x \to \infty} y = -\infty$$

13) How many relative minima does $p(x) = (x-2)(x+1)(x-4)(x+5)$ have?

2

14) State the multiplicity of the roots of $q(x) = -4x^2(x+1)^6(x-9)^9$.

$$0 \; m. \, 2$$
$$-1 \; m. -6$$
$$9 \; m. \, 9$$

15) Given $\quad \lim_{x \to \infty} v(x) = \infty, \quad \lim_{x \to -\infty} v(x) = \infty, \; v(4) = v(-1) = 0$

Write a second degree polynomial that could be $v(x)$?

$$x^2 - 3x - 4$$

Comprehensive Review (because each test includes items from each previous test)

16) Expand the binomial: $(2x+3)^3$

$$8x^3 + 36x^2 + 54x + 27$$

17) Find the a^2 term of the binomial expansion of $(3a-8)^8$

$$66060288a^2$$

18)
Simplify using polynomial long division $\dfrac{x^3+2x+18}{x^2+2x-3}$

$$x - 2 + \frac{9x + 12}{x^2 + 2x - 3}$$

You should consider reworking problems from homework assignments with which you struggled….