Math 109—Polynomial Worksheet Name: Key

1. Given $h(x) = -x^5 + 4x^4 - 3x^3 - x^2 + 4$, answer the following questions.
   a. Describe the end behavior of $h(x)$.

   degree = 5 $\quad x \to \infty \quad y \to -\infty$

   leading coefficient is neg $\quad x \to -\infty \quad y \to \infty$

   b. State the maximum number of turns possible for the graph of $h(x)$.

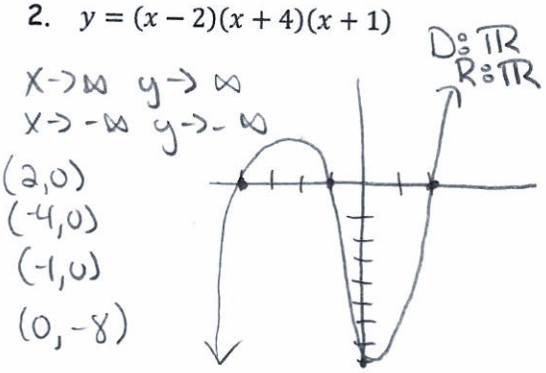
   4

   c. What is the y-intercept of $h(x)$?

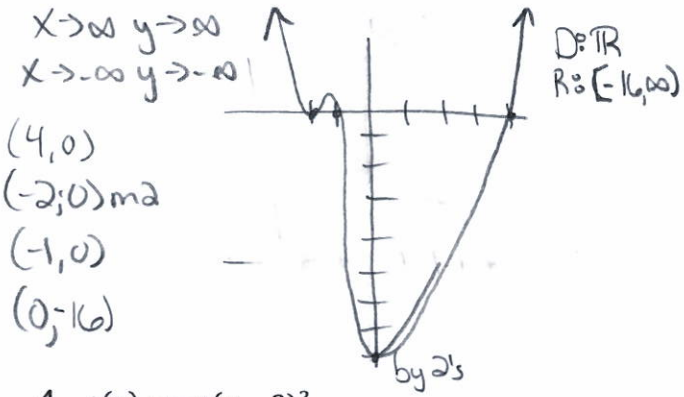
   (0,4)

For problems 2-7, use the end behavior (with limits), zeros, the y-intercept, and multiplicity to sketch the graph of the given polynomials.

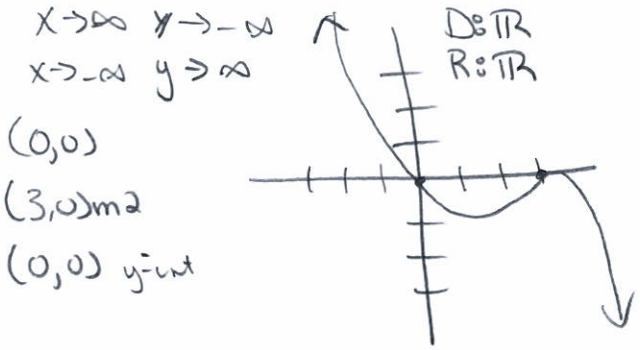
2. $y = (x-2)(x+4)(x+1)$



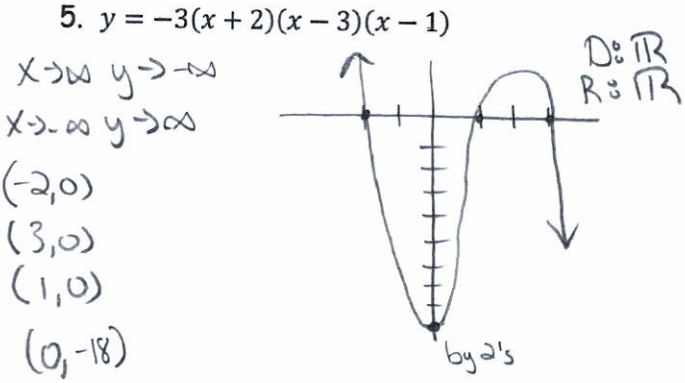
3. $f(x) = (x-4)(x+2)^2(x+1)$



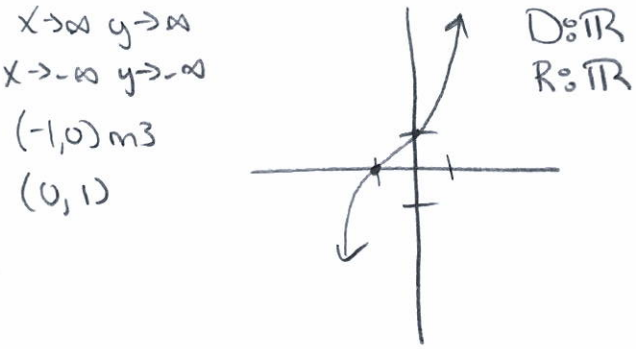
4. $g(x) = -x(x-3)^2$



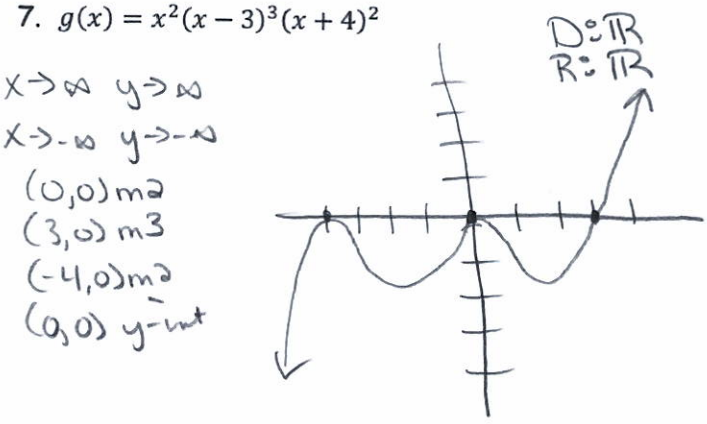
5. $y = -3(x+2)(x-3)(x-1)$



6. $f(x) = (x+1)^3$

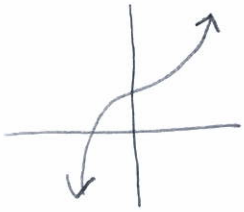


7. $g(x) = x^2(x-3)^3(x+4)^2$



8. Sketch a third degree polynomial that satisfies the following given information.

a. $g(x)$ has one x-intercept b. $g(x)$ has two x-intercepts c. $g(x)$ has thee x-intercepts



9. Is it possible to draw a third degree polynomial with no x-intercept? Explain your answer.

No. Because of the end behavior any odd power polynomial will have as $x \to \infty$ $y \to \infty$ or $x \to \infty$ $y \to -\infty$
$x \to -\infty$ $y \to -\infty$ $x \to -\infty$ $y \to \infty$

10. What is the least number of x-intercepts for a fourth degree polynomial? The most number of x-intercepts? (Please provide a picture for each as part of your explanation.)

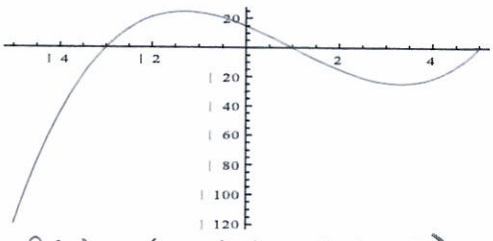
least number = 0 

most number = 4 

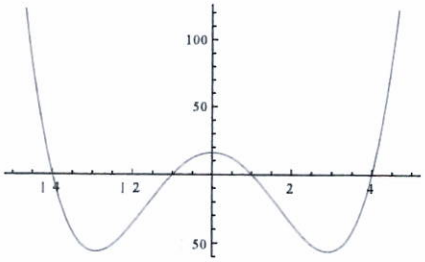
11. What is the least number of x-intercepts for a seventh degree polynomial? The most number of x-intercepts?

least = 1 most 7

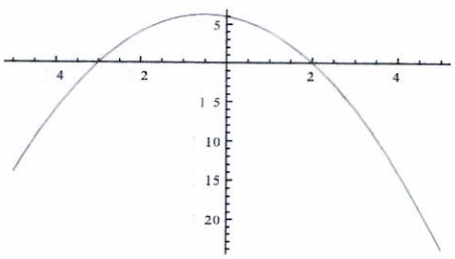
Write a polynomial equation for each of the following graphs. Leave your equation in factored form.

12. 

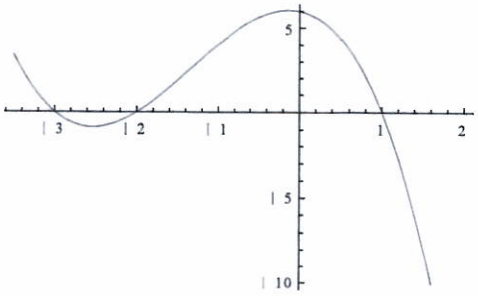
$f(x) = (x+3)(x-1)(x-5)$

14. 

$f(x) = (x+4)(x+1)(x-1)(x-4)$

13. 

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

15. 

$f(x) = -(x+3)(x+2)(x-1)$

Find all of the zeros for the following polynomials and write the equation in factored form.

16. $f(x) = x^3 - 3x^2 - 2x + 6$

$x^3 - 3x^2 - 2x + 6 = 0$

$\frac{6}{1} = \pm 1, 2, 3, 6$

± 1

3	1	-3	-2	6
		3	0	-6
	1	0	-2	0

$x^2 - 2 = 0$

$x = \pm\sqrt{2}$

$(3, 0)$

$(\pm\sqrt{2}, 0)$

17. $g(x) = 2x^3 + 9x^2 - 8x - 15$

$2x^3 + 9x^2 - 8x - 15 = 0$

$\frac{15}{2} = \pm 1, 3, 5, 15$

$\pm 1, 2$

-1	2	9	-8	-15
		-2	-7	15
	2	7	-15	0

$2x^2 + 7x - 15$

$(2x - 3)(x + 5)$

$(-1, 0)$

$(\frac{3}{2}, 0)$

$(-5, 0)$