

Name _____ Date _____ Period _____

Worksheet 3.1—Polynomial Functions

Show all work on a separate sheet of paper. Give simplified, exact values for all answers. **No Calculator is Permitted unless specifically stated.**

I. Multiple Choice

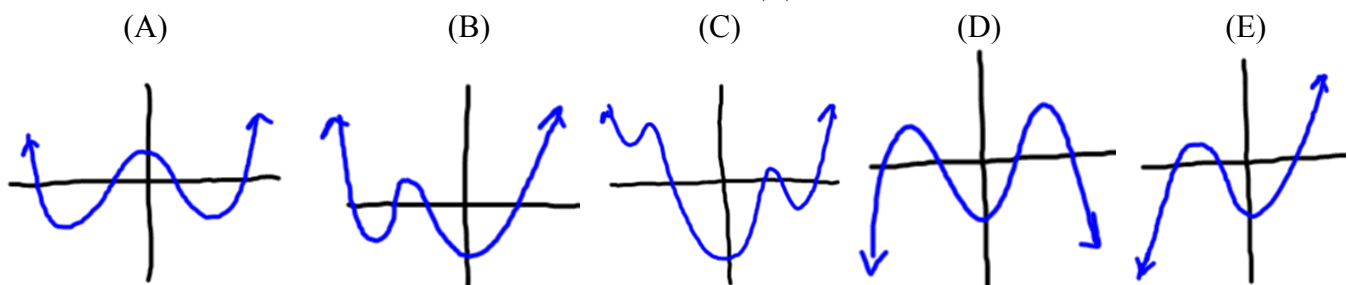
1. Which of the following functions is NOT a polynomial?

(A) $f(x) = \frac{-2.3x^4 - 6x + 11}{4}$ (B) $m(t) = 5t^2 + t^{-1} + 3$ (C) $P(x) = \pi x(x^2 - ex)$
 (D) $y = 5$ (E) $h(x) = 2.6x - 7.7x^3 + \sqrt{2}x$

2. The function $f(x) = -2x(x-3)^2(x+3)^3(x-6)$ has how many relative extrema?

(A) 7 (B) 6 (C) 5 (D) 4 (E) 3

3. Which of the following graphs could be the graph of $f(x) = 5x^3 - 5x + 5x^2 + x^4 - 6$?



4. Which of the following statements about a polynomial function with degree n is false?

- (A) has at most n turning points (B) may have up to n distinct roots
 (C) if n is odd, it has at least one root (D) if n is even, it may have no roots (E) all statements are true

5. A function whose only roots are $x = 1(m2)$, $x = -2(m3)$, and $x = 3(m1)$, that passes through the point $(-1, -2)$ has a y -intercept of what?

(A) 24 (B) -24 (C) $\frac{1}{8}$ (D) 2 (E) -3

II. Short Answer

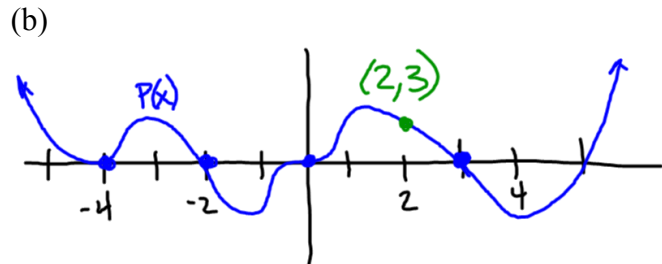
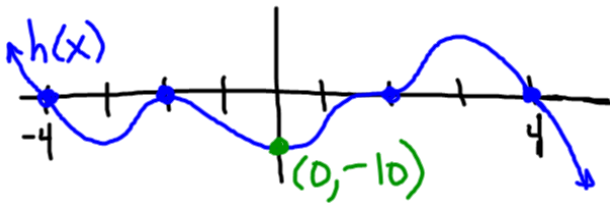
6. Find the roots (by factoring) and both end behaviors for each of the following polynomials. Graph each function.

(a) $f(x) = -\frac{1}{2}x(18 - 2x^2)$ (b) $P(x) = x^4 - 2x^3 + 8x - 16$

7. Sketch the following functions. Be sure to clearly show the roots and the multiplicities at each root.

(a) $f(x) = -3x(x-5)(x+4)^3(x-2)^2$ (b) $h(x) = \frac{2}{3}(x-2)^2(x+2)^2(x-5)(x+5)^3$

8. Write a (a) general equation in factored form of a polynomial whose only roots are $x = 3$ (m2), $x = -4$ (m1), and $x = 0$ (m3) and (b) a particular equation if the same polynomial passes through $(-2, 2)$
9. Write an equation in factored form of a cubic polynomial, f , with the following characteristics:
 $f(-5) = f(1) = f(6) = 0$, $f(-1) = -3$
10. Write both a general and particular equation, in factored form, of the polynomial whose graph is given below.



11. (Calculator Permitted) Find all the zeros and relative extrema of the function. List the open intervals of increasing and decreasing. $f(x) = x^4 + 0.1x^3 - 6.5x^2 + 7.9x - 2.4$
12. Which of the following statements are true regarding the graph of the cubic polynomial $f(x) = x^3 + bx^2 + cx + d$? If the statements are false, explain why.
- It intersects the y -axis in one and only one point.
 - It intersects the x -axis in at most three points.
 - It intersects the x -axis at least once.
 - $f(x)$ has the same end behaviors as $y = x^3$
 - It is symmetric with respect to the origin.
 - It passes through the origin.
 - It has at least two relative extrema.