

Name _____ Date _____ Period _____

Worksheet 3.1—Polynomial Functions

Show all work. 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 $f(x) = 5x^3 - 5x + 5x^2 + x^4 - 6$?

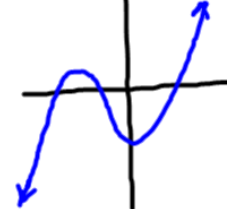
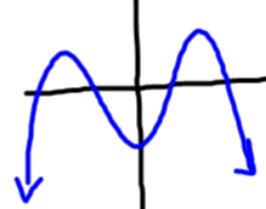
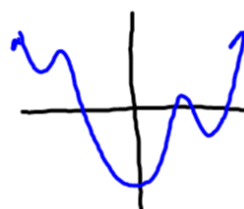
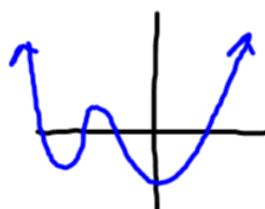
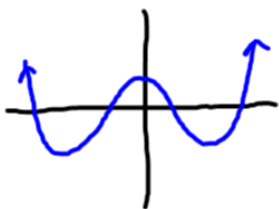
(A)

(B)

(C)

(D)

(E)



- _____ 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) $h(x) = \frac{2}{3}(x-2)^2(x+2)^2(x-5)(x+5)^3$

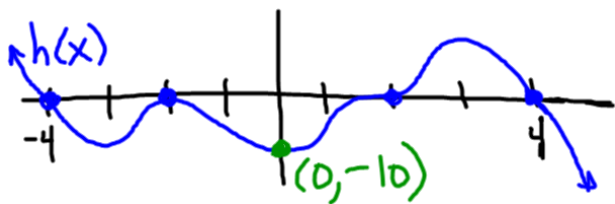
8. Write a (a) general equation in factored form of a polynomial whose only roots are $x = 3$ ($m2$), $x = -4$ ($m1$), and $x = 0$ ($m3$) and (b) a particular equation if the same polynomial passes through $(-2, 2)$

9. Write an equation in factored form of a cubic polynomial, f , with the following characteristics:

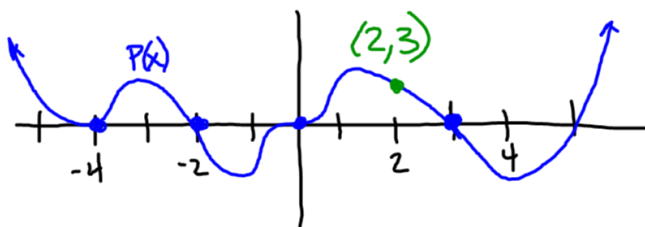
$$f(-5) = f(1) = f(6) = 0, \quad f(-1) = -3$$

10. Write both a general and particular equation, in factored form, of the polynomial whose graph is given below.

(a)



(b)



11. (Calculator Permitted) Find all the zeros and relative extrema of the function. List the open intervals of increasing and decreasing. $f(x) = x^4 + 0.1x^3 - 6.5x^2 + 7.9x - 2.4$

