

Analyzing Polynomial Functions Worksheet

I. Describe the end behavior of each function.

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

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

3. $f(x) = -6x^5 - 4x^3 + 5x + 2$

4. $f(x) = 3x^2 - 6x + 11$

II. State the maximum number of turns the graph of each function could have.

5. $f(x) = x^5 - 4x^3 + 5x + 1$

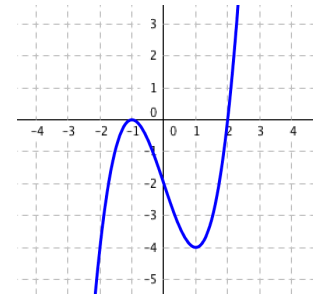
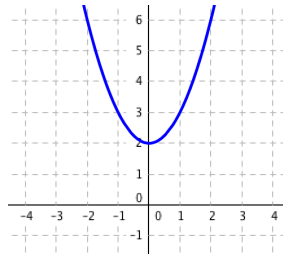
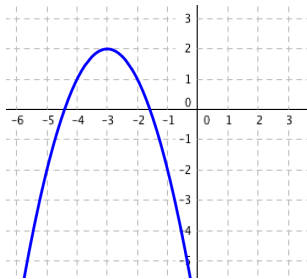
6. $f(x) = -x^2 - 1$

III. Using the graph of $f(x)$ Determine if the zeros of each function have an even or odd multiplicity. Explain.

7. $f(x) = -x^2 - 6x - 7$

8. $f(x) = x^2 + 2$

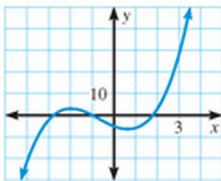
9. $f(x) = x^3 - 3x - 2$



IV. Determine the numbers of positive real zeros, negative real zeros, and imaginary zeros for the function with the given degree and graph. *Explain your reasoning.*

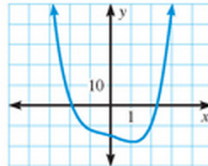
10.

Degree: 3



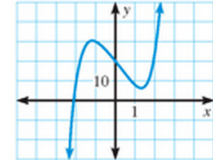
11.

Degree: 4



12.

Degree: 5



V. Simplify. Your answer should only contain positive exponents.

13. $\left(\frac{x^{-4}}{y^2}\right)^{-2}$

14. $(2x^0yz^3)^{-1}(4xy^3z)^3$

15. $\frac{3(xy^{-2})^3}{(27x^{-1})(5y)^2}$

VI. Find the zeros of polynomial function. Then state the number of x-intercepts.

16. $f(x) = 2x^4 - 11x^2 + 12$

17. $f(x) = x^3 - 4x^2 - 11x + 30$

18. $f(x) = 24x^3 + 81$

ANSWERS

1.

$$x \rightarrow -\infty, f(x) \rightarrow -\infty$$

$$x \rightarrow \infty, f(x) \rightarrow \infty$$

2.

$$x \rightarrow -\infty, f(x) \rightarrow -\infty$$

$$x \rightarrow \infty, f(x) \rightarrow -\infty$$

3.

$$x \rightarrow -\infty, f(x) \rightarrow \infty$$

$$x \rightarrow \infty, f(x) \rightarrow -\infty$$

4.

$$x \rightarrow -\infty, f(x) \rightarrow \infty$$

$$x \rightarrow \infty, f(x) \rightarrow \infty$$

5. 4

6. 1

7. The graph has a cross at both zeros therefore both zeros have an *odd* multiplicity.

8. There are no real zeros, therefore both zeros must be imaginary. Since imaginary zeros come in pairs, each zero has an *odd* multiplicity.

9. The graph has a bounce at $x=-1$, therefore this zero has an *even* multiplicity. The graph has a cross at $x=2$, therefore this zero has an *odd* multiplicity.

10. 1 positive real zero, 2 negative real zero, 0 imaginary zeros

11. 1 positive real zero, 1 negative real zero, 2 imaginary zeros

12. 0 positive real zero, 1 negative real zero, 4 imaginary zeros

13. x^8y^4

14. $32x^3y^8$

15. $\frac{x^4}{225y^8}$

16. $x = \pm \frac{\sqrt{6}}{2}, \pm 2$; 4 x-intercepts

17. $x = -3, 2, 5$; 3 x-intercepts

18. $x = -\frac{3}{2}, \frac{3 \pm 3i\sqrt{3}}{4}$; 1 x-intercept