

Determine which are polynomial functions. For those that are, state the degree and leading coefficient.

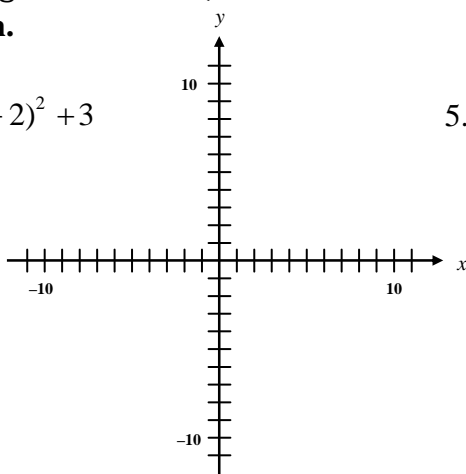
1. $f(x) = 2x^2 + x - 9$

2. $f(x) = \frac{3}{x} + 1$

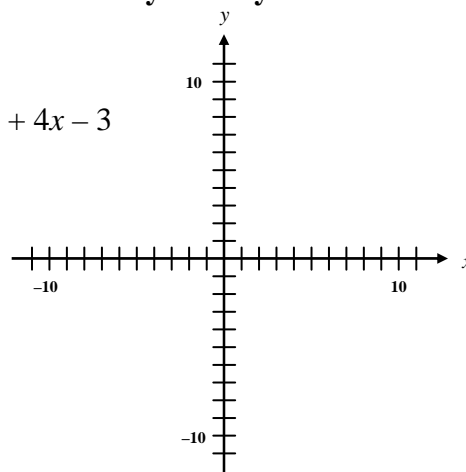
3. Write a linear equation for the given information $f(-2) = 5$ and $f(1) = -7$. Put your answer in general form.

(Non-graphing calculator) **For #4 & 5 find the vertex and axis of symmetry. Sketch the graph.**

4. $f(x) = -\frac{1}{2}(x - 2)^2 + 3$



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



6. Write an equation for the quadratic function with a vertex of $(-3, 4)$ and containing point $(-5, -8)$.

7. Identify the constant of variation and the power for the function below. Identify which of the power functions are also monomial functions.

a. $f(x) = 4x^{1/3}$

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

c. $f(x) = -2x^{-3}$

d. $f(x) = (2/3)x^4$

8. Larry uses a slingshot to launch a rock straight up from a point 6 ft above level ground with an initial velocity of 170 ft/sec. Use the fact that $s(t) = -\frac{1}{2}gt^2 + v_0t + s_0$ ($g = 32 \text{ ft/sec}^2$ or 9.8 m/sec^2)
- Find an equation that models the height of the rock t seconds after it is launched.
 - What is the maximum height of the rock? When will it reach that height? Determine the answer algebraically and graphically.
 - When will the rock hit the ground? Determine the answer algebraically and graphically.

Write the statement as a power function equation. Use k as the constant of variation.

- The area of an equilateral triangle varies directly as the square of the side s .
- The height h of a cone with a fixed volume varies inversely as the square of its radius r .

For questions 11 and 12, solve the problem.

11. The period of vibration P for a pendulum varies directly as the square root of the length L . If the period of vibration is 3.5 sec when the length is 49 inches, find k , the constant of variation. Determine what the period is when $L = 5.0625$ inches.

12. The gravitational attraction A between two masses varies inversely as the square of the distance between them. The force of attraction is 2.25 lb when the masses are 4 ft apart. Find k , the constant of variation, and determine what the attraction is when the masses are 6 ft apart.

For questions 13 and 14, use limit notation to describe the end behavior.

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

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

State the degree and the zeros of the polynomial function. State the multiplicity of each zero. Sketch the function.

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

16. $f(x) = 3x^3 - 18x^2 + 27x$

17. (Non-graphing calculator) Using synthetic division, find all zeros of the function below given that -1 is a zero with multiplicity of 2.

$$g(x) = 4x^4 - 4x^3 - 11x^2 + 6x + 9$$

18. Find a polynomial function with a leading coefficient of 2 and zeros of $\frac{1}{3}$, -1 and 4. Express the answer in standard form.

19. The table shows the number of employees of the Gizmo Company.

Year	1972	1975	1978	1980	1983	1986
Number of Employees	247	475	658	546	493	605

_____ (a) Find a cubic regression equation, using $L1 =$ years after 1970. Round coefficients to the nearest hundredth.

_____ (b) Use the regression equation to predict the number of employees in 1990.

For questions 20 and 21, divide and write a summary statement in polynomial form. Is the divisor a factor of the polynomial?(yes/no)

20. $\frac{4x^3 - 8x^2 + 3x + 4}{2x + 1}$

21. $(2x^3 - 5x + 9) \div (x + 3)$

22. Use the remainder theorem to find the remainder when $f(x) = x^3 - 3x + 18$ is divided by $x + 3$. Is $x + 3$ a factor of $f(x)$?

23. Use the Rational Zeros Theorem to list all the potential zeros of $f(x) = 2x^3 - 7x^2 - 49x + 5$.

Review 2.1-2.4 Key

1. Yes, degree = 2,
Leading coefficient: 2
2. Not a polynomial
3. $4x + y + 3 = 0$
4. $V(2, 3); x = 2$
5. $V(-1, -5); x = -1$
6. $y = -3(x + 3)^2 + 4$
7. a) constant: 4; power: 1/3
b) Monomial; constant: -2
Power: 3
c) Constant: -2, power: -3
d) Monomial; constant: 2/3
Power: 4
8. a) $h = -16t^2 + 170t + 6$
b) 5.31 seconds; 457.12 feet
c) 10.66 seconds
9. $A = ks^2$
10. $h = k/r^2$
11. $k = 0.5; P = 1.125$ sec
12. $k = 36; A = 1$ lb
13. $\lim_{x \rightarrow +\infty} f(x) = -\infty$
 $\lim_{x \rightarrow -\infty} f(x) = +\infty$
14. $\lim_{x \rightarrow +\infty} f(x) = +\infty$
 $\lim_{x \rightarrow -\infty} f(x) = +\infty$
15. Degree: 6,
Zeros: $x = 0$ (multiplicity 1)
 $x = -4$ (multiplicity 2)
 $x = -1$ (multiplicity 3)
16. Degree: 3
Zeros: $x = 0$ (multiplicity 1)
 $x = 3$ (multiplicity 2)
17. Zeros: $x = 1$ (multiplicity 2)
 $x = \frac{3}{2}$ (multiplicity 2)
18. $y = 2(x - \frac{1}{3})(x + 1)(x - 4) = 2x^3 - \frac{20}{3}x^2 - 6x + \frac{8}{3}$
19. a) $y = 0.834x^3 - 25.871x^2 + 248.115x - 167.677$
b) approximately 1118 employees
20. $2x^2 - 5x + 4$; yes $(2x + 1)$ is a factor
Summary: $(2x+1)(2x^2 - 5x + 4) = 4x^3 - 8x^2 + 3x + 4$
21. $2x^2 - 6x + 13 + \frac{-30}{x+3}$
Summary: $(x + 3)(2x^2 - 6x + 13) - 30 = 2x^3 - 5x + 9$
22. Remainder = 0; yes, because the remainder is zero.
23. potential rational zeros: $\pm 1 \quad \pm \frac{1}{2} \quad \pm 5 \quad \pm \frac{5}{2}$