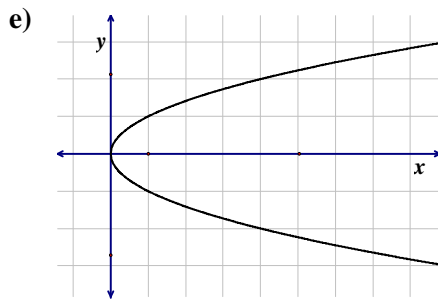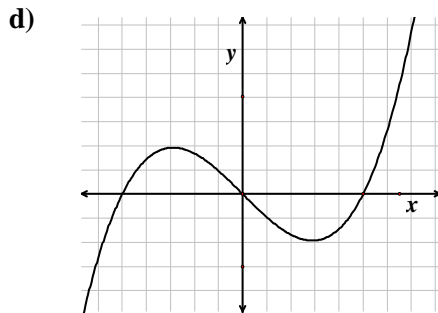Name: _____ Date: _____

## Chapter 5 Test

**1.** State whether each of the following represents a function.

**a)** $g(x) = 2x^2 + 7x - 4$

**b)** $y = x + \dfrac{1}{x}$

**c)** $x^2 + y^2 = 9$

**d)**



**e)**



**2.** State whether each of the following represents a polynomial function.
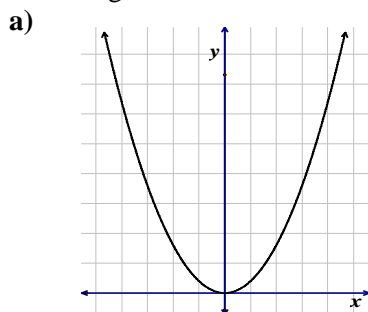
**a)** $h(x) = 2x + 1$

**b)** $y = \sqrt{x}$

**c)** $y = \sin^2 x + 3\sin x + 2$
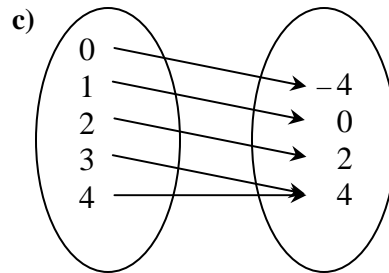
**d)** $g(x) = 4x^4 - 6x^2 + 7$

**e)** $f(x) = 3x^2 + 4 - x^{-2}$

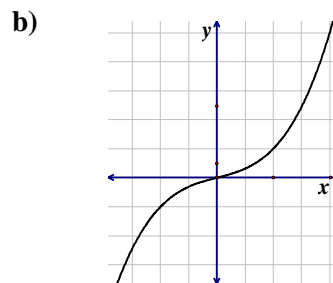**3.** State the domain and range of each of the following.

**a)**



**b)**

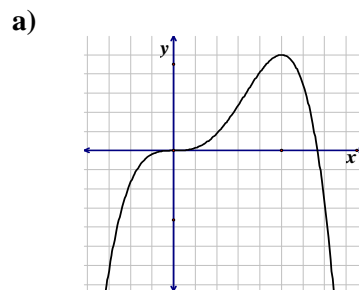| x | y |
|---|---|
| −2 | −8 |
| −1 | −1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 8 |

**c)**



**d)** $y = x^3 + 1$

**4.** Answer the following questions for each graph.

   **i)** Does it represent a function with even degree or odd degree?

   **ii)** What is the sign of the leading coefficient?

**a)**



**b)**



**5.** Explain how the degree of a polynomial function is related to the maximum number of *x*-intercepts on its graph.

**6.** If a polynomial function has no *x*-intercepts, what do you know about the degree of the function? Explain your reasoning.

**7.** For each of the following functions, state the values of *x* at which the graph crosses the *x*-axis. Note: Do not include values of *x* at which the graph only touches the *x*-axis.
   **a)** $f(x) = x(x + 10)(x - 5)$
   **b)** $g(x) = (x + 7)^2(x - 1)$

**8.** For the graph defined by $y = (x + 1)^2(x - 2)$, answer the following questions.
   **a)** At which value(s) of *x* does it cross the *x*-axis?
   **b)** At which value(s) of *x* does it touch but not cross the *x*-axis?
   **c)** What is the degree of the polynomial function? Describe the end behaviour.
   **d)** Sketch the function.

**9.** For the following function, the *x*-intercepts are –2, 0, and 2. Suggest an equation that might represent this function. Explain your reasoning.
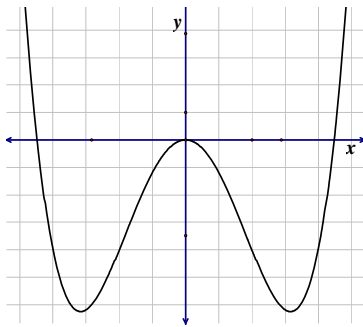


**10.** State whether each of the following equations represents an even function, an odd function, or neither.
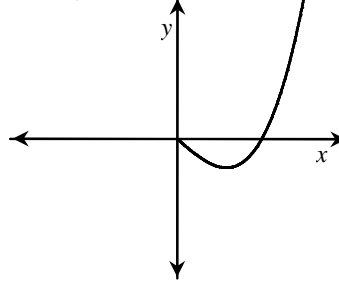   **a)** $y = x^4 + x^2 + 1$
   **b)** $xy = 9$
   **c)** $y = x^3 + 1$
   **d)** $y = \dfrac{x}{x^2 + 1}$

**11.** Is there a difference between a function of odd degree and an odd function? Explain your reasoning.

**12.** The following represents half of an odd function. Sketch the missing half.



**13.** Describe two different ways a graphing calculator can be used to determine the *y* values of a function for given *x* values.

**14.** Factor the following expressions completely.
   **a)** $x(x + 2) - 5(x + 2)$
   **b)** $5a^2 + 10ab - 75b^2$
   **c)** $4r^2 - 12r + 9$
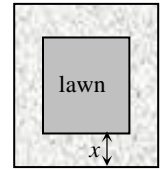   **d)** $100x^2 - 25y^2$
   **e)** $12x^2 - 17x - 40$

**15.** A 10-m by 10-m lawn is surrounded on all four sides by a concrete sidewalk of width *x* metres. The area of the sidewalk is represented by the equation $A(x) = 4x^2 + 40x$.
   **a)** What is meant by $A(2)$?
   **b)** Evaluate $A(2)$.
   **c)** Determine the width of the sidewalk when its area is 80 m². Express your answer to the nearest tenth of a metre.



**16. a)** Factor the expression $x^2 + 5x - 14$.
   **b)** Explain how the answer from part a) relates to the *x*-intercepts of the graph defined by $y = x^2 + 5x - 14$.

**17.** The height of a ball, in metres, *t* seconds after Emma kicks it is given by $h(t) = -5t^2 + 20t$.
   **a)** Determine the ball's height 1 s after Emma kicks it.
   **b)** How long is the ball in the air? Explain how you know.
   **c)** Use the answer from part b) to determine when the ball reaches its maximum height, and what the maximum height is.