Complete Questions
 # 1-8

For help with questions 1 and 2, refer to Example 1.

1. For each polynomial function:

   i) state the degree and the sign of the leading coefficient

   ii) describe the end behaviour of the graph of the function

   iii) determine the x-intercepts
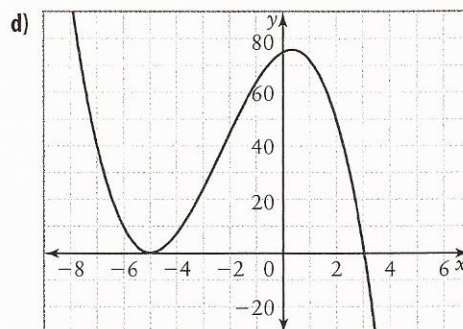
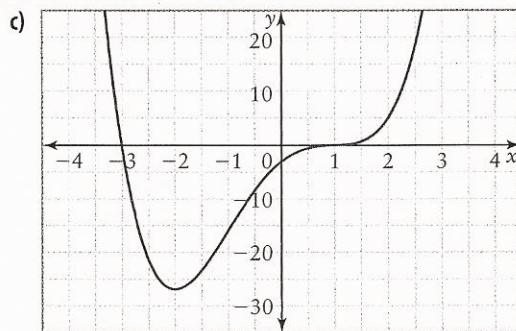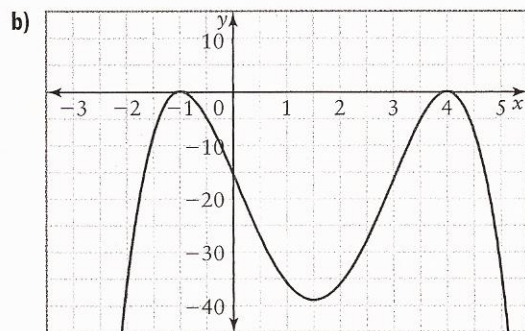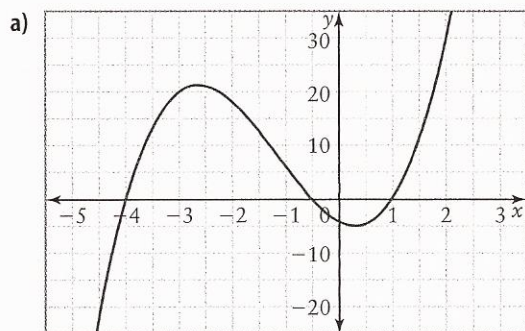   a) $f(x) = (x - 4)(x + 3)(2x - 1)$

   b) $g(x) = -2(x + 2)(x - 2)(1 + x)(x - 1)$

   c) $h(x) = (3x + 2)^2(x - 4)(x + 1)(2x - 3)$

   d) $p(x) = -(x + 5)^3(x - 5)^3$

2. For each graph, do the following.

   i) State the x-intercepts.

   ii) State the intervals where the function is positive and the intervals where it is negative.

   iii) Explain whether the graph might represent a polynomial function that has zeros of order 2 or of order 3.

a)

b)

c)

d)

For help with question 3, refer to Example 2.

3. a) Determine the zeros of each polynomial function. Indicate whether they are of order 1, 2, or 3.

   i) $f(x) = -2(x - 3)(x + 2)(4x - 3)$

   ii) $g(x) = (x - 1)(x + 3)(1 + x)(3x - 9)$

   iii) $h(x) = -(x + 4)^2(x - 1)^2(x + 2)(2x - 3)$

   iv) $p(x) = 3(x + 6)(x - 5)^2(3x - 2)^3$

   b) Determine algebraically if each function is even or odd.

   c) Sketch a graph of each function in part a).

For help with questions 4 and 5, refer to Example 3.

4. Determine, algebraically, whether each function in question 1 has point symmetry about the origin or line symmetry about the y-axis. State whether each function is even, odd, or neither. Give reasons for your answer.

5. i) Determine whether each function even, odd, or neither. Explain.

ii) Without graphing, determine if each polynomial function has line symmetry about the y-axis, point symmetry about the origin, or neither. Explain.

a) $y = x^4 - x^2$

b) $y = -2x^3 + 5x$

c) $y = -4x^5 + 2x^2$

d) $y = x(2x + 1)^2(x - 4)$

e) $y = -2x^6 + x^4 + 8$

B Connect and Apply

6. Determine an equation for the polynomial function that corresponds to each graph.

a)

b)

c)

d)
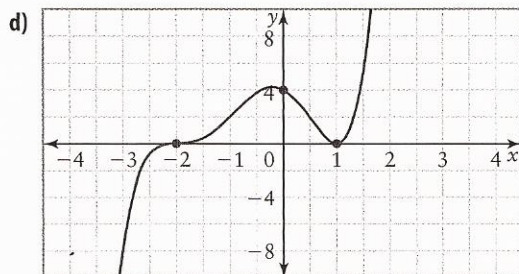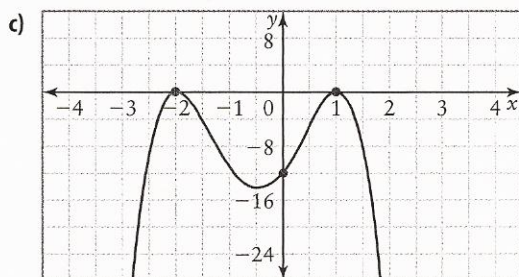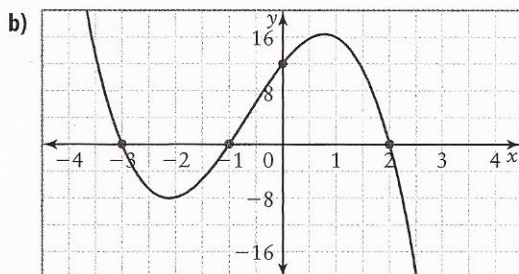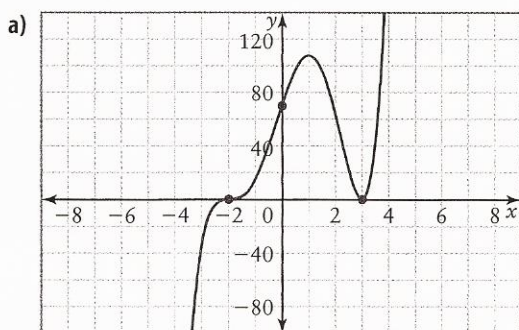
7. Determine an equation for each polynomial function. State whether the function is even, odd, or neither. Sketch a graph of each.

a) a cubic function with zeros -2 (order 2) and 3 and y-intercept 9

b) a quartic function with zeros -1 (order 3) and 1 and y-intercept -2

c) a quintic function with zeros -1 (order 3) and 3 (order 2) that passes through the point $(-2, 50)$

d) a quintic function with zeros -3, -2 (order 2), and 2 (order 2) that passes through the point $(1, -18)$

8. Without graphing, determine if each polynomial function has line symmetry, point symmetry, or neither. Verify your response using technology.

a) $f(x) = -6x^5 + 2x$

b) $g(x) = -7x^6 + 3x^4 + 6x^2$

c) $h(x) = x^3 - 3x^2 + 5x$

d) $p(x) = -5x^3 + 2x$

9. Each polynomial function has zeros at -3, -1, 2. Write an equation for each function. Then, sketch a graph of the function.

Reasoning and Proving
Representing   Selecting Tools
Problem Solving
Connecting   Reflecting
Communicating

a) a cubic function with a positive leading coefficient

b) a quartic function that touches the x-axis at -1

c) a quartic function that extends from quadrant 3 to quadrant 4

d) a quintic function that extends from quadrant 3 to quadrant 1