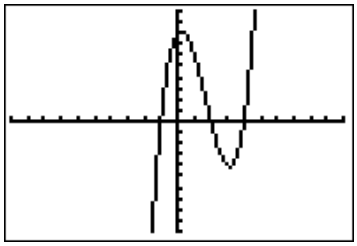
Name: _____ Date: _____

1.3 Equations and Graphs of Polynomial Functions

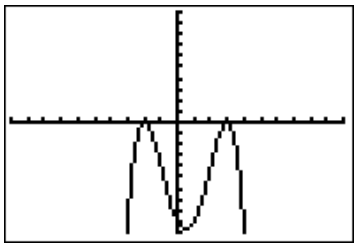
BLM 1–11

1. For each polynomial function
i) state the degree and sign of the leading coefficient
ii) describe the end behaviour of the graph of the function
iii) determine the x-intercepts
a) $f(x) = (x + 2)(3 – x)(x + 1)$
b) $p(x) = –2x(x – 4)^2(2 – x)$
c) $h(x) = x(1 – 2x)^3(x + 3)^2$
d) $f(x) = (2x – 5)^2(x – 2)^2(x + 1)$

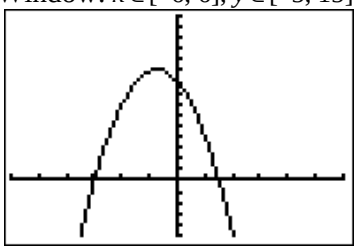
2. For each graph do the following.
i) State the x-intercepts.
ii) State the least possible degree and the sign of the leading coefficient.
iii) Give the interval(s) where the function is positive and the interval(s) where the function is negative.
a)



b)



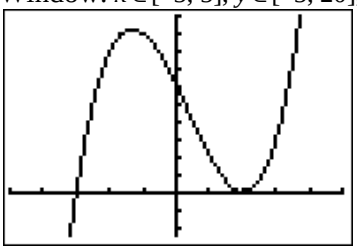
c) Window: $x \in [–6, 6]$, $y \in [–5, 15]$



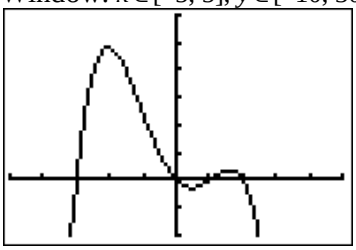
3. **i)** Determine the zeros of each polynomial function. Indicate whether the zeros are of order 1, 2, or 3.
a) $f(x) = 2x(x – 2)(3 – x)$
b) $g(x) = (x + 1)^3(5x – 2)^2$
c) $h(x) = 3(x + 2)^2$
d) $p(x) = –(x + 3)^2(x – 3)^2$
ii) Determine algebraically if each function is even, odd, or neither.
iii) Sketch a graph of each function.

4. **i)** Determine algebraically whether each function has point symmetry about the origin or line symmetry about the y-axis. State whether each function is even, odd, or neither. Explain.
a) $f(x) = –4x(x – 1)(x + 1)$
b) $g(x) = (x – 2)^3(x + 2)^3$
c) $h(x) = 2x(x – 3)(x + 4)$
d) $p(x) = –(x – 4)(x – 2)(x + 4)(x + 2)$
e) $y = 3x^6 – 2x^4 + 1$
f) $y = –5x^3 – 3x$
ii) Verify your answers in part i) using technology.

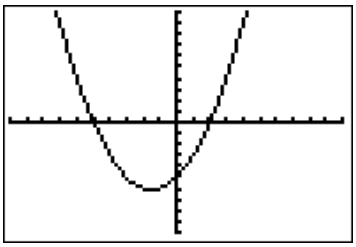
5. Determine an equation for the polynomial function that corresponds to each graph.
a) Window: $x \in [–5, 5]$, $y \in [–5, 20]$, Yscl = 2



b) Window: $x \in [–5, 5]$, $y \in [–10, 30]$, Yscl = 5



c)



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

a) a quartic function with zeros –1, 3(order 2), and 5 and *y*-intercept 3

b) a cubic function with zeros –3, $-\frac{1}{2}$, and 4 and *y*-intercept 24

c) a quintic function with zeros $-\frac{2}{3}$, –2(order 2), and 3(order 2) and *y*-intercept –36

7. Each polynomial function has zeros at $-\frac{1}{2}$, 3, and 5. Write an equation for each function. Then, sketch a graph of the function.

a) a quartic function with a negative leading coefficient

b) a quintic function that touches the *x*-axis at $-\frac{1}{2}$ and at 5

c) a cubic function that extends from quadrant 2 to quadrant 4.

8. **i)** Determine the zeros of each polynomial function.

a) $f(x) = x^3 - 27$

b) $g(x) = (x^2 - 64)(x^2 + 3x - 4)$

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

ii) Use graphing technology to verify your answers in part i).

9. **a)** Write an equation for an odd function with three *x*-intercepts, one of which is $\frac{7}{2}$.

b) Verify algebraically that you have created an odd function in part a).

c) Determine an equation for a function that has the three *x*-intercepts from part a) and that passes through the point (1, –15).

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