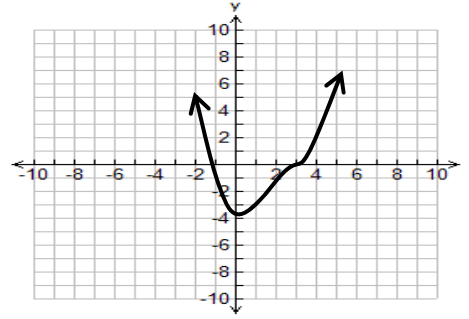


1.5B – Polynomial Functions

Example 1: Sketch the following polynomial functions;

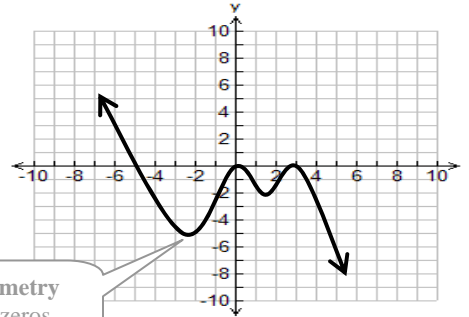
a) $g(x) = (x - 3)^3(x + 1)$

opens: up
 degree: 4th (so 4 possible sections)
 zeros: $x = 3$ (skewed cross)
 $x = -1$ (crosses x-axis)



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

open: n/a
 degree: 5th (so 5 possible sections starting with negative)
 zeros: crosses at $x = -5$
 touches at $x = 0, +3$



Use symmetry between zeros

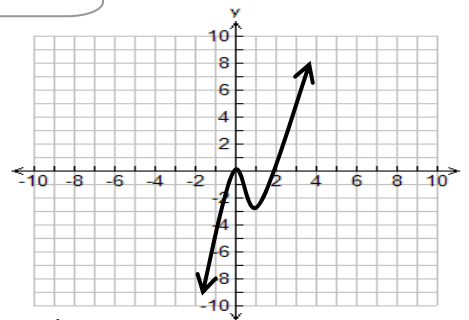
c) $f(x) = 4x^3 - 8x^2$

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

Need to re-write in factored form

What might be the effect of changing 4 to 2?

open: n/a
 degree: 3rd (so 3 possible sections starting with positive)
 zeros: crosses at $x = +2$
 touches at $x = 0$



Example 2: Determine the exact functions given the following information;

a) 3rd degree function has zeros at -2, +2 and +3 and passes through point (1, 12)

So know family of function would be:
 Substitute in point (1, 12) and solve for k

$$f(x) = k(x + 2)(x - 1)(x - 3)$$

$$12 = k(1 + 2)(1 - 2)(1 - 3)$$

$$12 = 6k$$

$$2 = k$$

Therefore

$$f(x) = 2(x + 2)(x - 1)(x - 3)$$

b) 4th degree function touches the x-axis at -4 and crosses x-axis at 0 and +2. (-1, -9) is a point on function.

So function family is: $g(x) = k(x + 4)^2(x - 0)(x - 2)$

Sub in point (-1, -9):
 $-9 = k(-1 + 4)^2(-1 - 0)(-1 - 2)$
 $-9 = 27k$
 $-1/3 = k$

You can substitute any points on the graph but the zeros, namely (#, 0)

Therefore

$$g(x) = -1/3(x + 4)^2(x - 0)(x - 2)$$

1.5B – Polynomial Functions Practice Questions

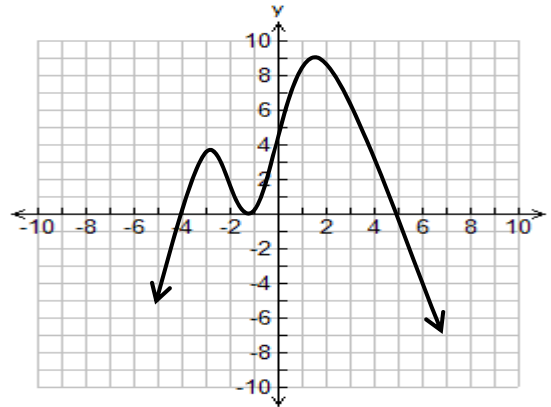
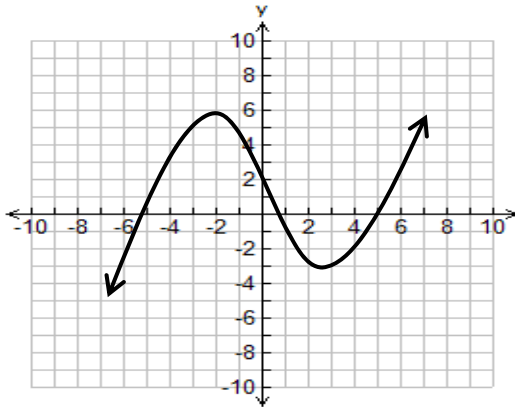
1. Sketch each of the following functions on a separate axis.

- Positive 3rd degree function that has zeros at -3, -1 and +3.
- $f(x) = (x - 3)(x + 4)^3(x - 1)$
- $y = (x - 2)(3 - x)$
- $f(x) = -(x + 1)(x + 4)(5 - x)$
- $g(x) = -(x - 1)(4 - x)^2$
- $y = x^2(x - 10)(x - 20)(x + 40)$
- $f(x) = -(x - 1)(1 - 2x)(x + 3)(5 + 2x)$
- $g(x) = (x - 15)^2(x + 30)^2$
- $h(x) = (2x - 1)^3(x - 5)$
- $g(x) = 3x^3 - 27x$
- $y = -x^3 + x^2 + 6x$

2. Determine the exact equation of the function given the information below;

- $f(x) = k(x - 1)(x + 2)$ and goes through point (2, -2)
- $g(x) = kx^2(x - 2)$ and $g(1) = -5$.
- 3rd degree function has zeros at -2, +2 and +3 and passes through point (1, -18)
- 4th degree function touches the x-axis at -4 crosses x-axis at 0 and +2. (-1, 54) is a point on function.
- Use graph below

f) use graph below



Answers 2. a) $f(x) = -\frac{1}{2}(x-1)(x+2)$ **b)** $g(x) = 5x^2(x-2)$ **c)** $f(x) = -3(x+2)(x-2)(x-3)$ **d)** $m(x) = 2x(x+4)^2(x-2)$

e) $y = \frac{2}{21}(x+5)(x-1)(x-5)$ **f)** $y = -\frac{1}{8}(x+4)(x+1)^2(x-5)$

1.5B - Sketching Practice Sheet

