

Review Outline Chapter 3

1. Simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$ for a polynomial function.

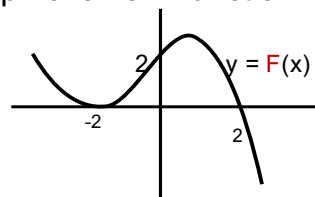
EG. for $H(x) = 3 - 4x - 4x^2$ find $\frac{H(x+h) - H(x)}{h}$...and simplify completely.

2. Sketch the graph of a function using basic shapes combined with transformations.

E.G.: Apply transformations to basic functions to obtain the graph of a new function.

a) $f(x) = 2 - \sqrt{x+1}$ b) $g(x) = \frac{1}{2}|-x| + 2$

c) $h(x) = F(x+2) - 3$ d) $G(x) = F(2x)$



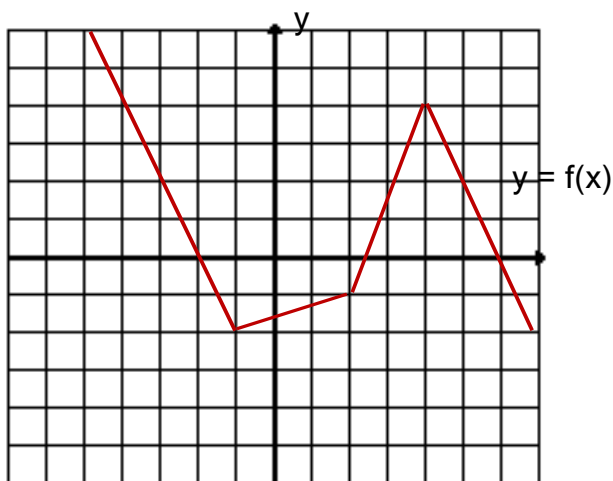
3. Identify the extreme value & graph of a quadratic function by changing the form $f(x) = ax^2 + bx + c$ to the form $f(x) = a(x-h)^2 + k$ (completing the square).

E.G.: For $f(x) = 2x^2 - 8x + 11$

- Express $f(x)$ in the form $f(x) = a(x-h)^2 + k$.
- Find the extreme value of $f(x)$. What type of extreme value is it?
- Sketch $f(x)$.

4. Find the average rate of change of a function on a specified interval.

- Find the average rate of change of $f(x) = x^3 + 2$ on the interval $[0, 2]$.
- Given the graph of $y = f(x)$ below,



- find the average rate of change of f on $[-3, 2]$ and
- identify the intervals on which f is increasing, and
- identify the intervals on which f is decreasing.
- (Does f appear to have any extreme points? Explain.)

5. Find a composite function and its domain.

EG For $f(x) = \frac{1}{x+3}$ and $g(x) = \frac{1}{x-2}$... find:

- $f \circ g(x)$ [do not simplify]
- the domain of $f \circ g(x)$ (!)

6. Find an inverse function.

a) For $g(x) = 2x^3 - 1$, find $g^{-1}(x)$.

b) For $f(x) = \frac{2+5x}{3-4x}$, find $f^{-1}(x)$.