1. **Functions**
   (a) Definition: As a rule which maps an input (*independent variable*) to an output (*dependent variable*).
   (b) Representation: Graphs, Tables, Set notation (pictorial view)
   (c) Vertical line test ...
   (d) Domain: All the values that can the independent variable can take
   (e) Range: All the values that can the dependent variable takes
   (f) Piecewise defined functions ...
2. **Translations and Reflections of Functions**
   (a) $y = f(x) + c$: Shift c units up
   (b) $y = f(x) - c$: Shift c units down
   (c) $y = f(x + c)$: Shift c units left
   (d) $y = f(x - c)$: Shift c units right
   (e) $y = -f(x)$: Reflection about the $x-$ axis
   (f) $y = f(-x)$: Reflection about the $y-$ axis

   If you are asked for $y = f(-x + c)$, first do the shifting then do the reflection.
3. **Combining Functions**
   (a) Horizontal line test ...
   (b) Finding the inverse: Given $y = f(x)$, solve for x, in terms of y, or, replace x with y in $y = f(x)$ and solve for y, in terms of x.
   (c) Inverse is the reflection about $y = x$.
4. **Average Rate of Change**

$$\frac{\Delta y}{\Delta x} = \frac{f(t) - f(a)}{t - a}$$

5. **Terminology**
   (a) **x-intercept:** ...
   (b) **y-intercept:** ...
   (c) **maximum value:** ...
   (d) **minimum value:** ...
   (e) **increasing:** ...
   (f) **decreasing:** ...
   (g) **turning point:** ...
6. **Quadratic Functions**
7. **Completing the Square** ...
   $f(x) = ax^2 + bx + c$
   Factor out the coefficient of x^2, (i.e. a), then add and subtract square of one half of the coefficient of the x term (i.e. $(b/2a)$)
   $\vdots$
   $f(x) = a\left(x + \left(\frac{b}{2a}\right)\right)^2 + \left(\frac{-b^2 + 4ac}{4a}\right)$
8. **Coordinates of the vertex**
   $\left(\frac{-b}{2a}, \frac{-b^2 + 4ac}{4a}\right)$
9. **Polynomials**
   (a) Degree: largest exponent
   (b) Leading coefficient: coefficient of the highest term
   (c) Power functions: $y = x^n$, graphs of them.
10. **Sketching Graphs**
    - Polynomials: ...
    - Rational functions: ...

    (a) Factorize the numerator polynomial and the denominator polynomial.
    (b) Find the vertical asymptotes.
    (c) Find the $x-$intercepts.
    (d) Find the $y-$intercept.
    (e) Find the horizontal and slant asymptotes.
    (f) Find the excluded regions.
    (g) Analyze the behavior near the $x-$intercepts and asymptotes.
11. **Exponential Function** $y = b^x$
12. **Exponential Function** $y = \log_b x$
13. **Properties of logarithms**
    (a) $\log_b b = 1$
    (b) $\log_b 1 = 0$
    (c) $b^{\log_b x} = x$
    (d) $\log_b(MN) = \log_b M + \log_b N$
    (e) $\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N$
    (f) $\log_b x^n = n \log_b x$
    (g) $\log_a x = \dfrac{\log_b x}{\log_b a}$