MATH 11010: Exponential Functions Section 4.2

- **Exponential functions:** The function $f(x) = a^x$, where x is a real number, $a > 0$ and $a \neq 1$, is called an **exponential function** with base a.
- **Properties of the graph of** $f(x) = a^x,\ a > 0, a \neq 1$
  - * Domain is all real numbers.
  - * Range is $(0, \infty)$.
  - * Always crosses through the point $(0, 1)$.
  - * $y = 0$ is a horizontal asymptote.
  - * The function is one-to-one.
  - * If $a > 1$, then the function is increasing; if $0 < a < 1$, then the function is decreasing.

Example 1: Sketch the graph of the following functions.

(a) $f(x) = 2^{x-1} + 3$

(b) $f(x) = \left(\frac{1}{4}\right)^{x+2} - 1$

- **Compound Interest**: The amount of money A that a principal P will grow to after t years at interest rate r (in decimal form), compounded n times per year, is given by the formula:

$$\boxed{A = P\left(1 + \frac{r}{n}\right)^{nt}}$$

Example 2: If \$4000 is borrowed at a rate of 16% interest per year, compounded quarterly, find the amount due at the end of 4 years? 8 years?

Example 3: If \$3000 is borrowed at a rate of 12% interest per year, find the amount due at the end of 5 years if the interest is compounded annually? monthly? daily?

Homework: pp 370-371; 5-10 all, 27–53 odd.