MTH 112
EXPONENTIALS AND LOGARITHMS

**Expressions**
- Exponential \( f(x) = ab^x \)
  - \( b > 1 \) = growth, \( 0 < b < 1 \) = decay
- Logarithms \( \log_b N = P \)
  - \( B = \) base, \( N = \# \), \( P = \) power
- Common Log = base 10; \( \log \)
- Natural Log = base \( e \); \( \ln \)

**Equations**
- Exponential \( f(x) = ab^x \)
  - Take log of both sides.
- Logarithms \( \log_b N = P \)
  - Write in exponential form.
  - Use properties while solving and simplify.

**Properties**
- Product prop. \( \log_b xy = \log_b x + \log_b y \)
- Quotient property \( \log_b (x/y) = \log_b x - \log_b y \)
- Power property \( \log_b N^x = x \log_b N \)
- Change of Base \( \log_b x = \frac{\log x}{\log b} \)
- \( \log_a a^x = x \)
- \( a^{\log_a x} = x \)
- \( \ln e^x = x \)
- \( e^{\ln x} = x \)
- \( a^x = a^y \iff x = y \)

**Graphs**
- Exponential \( y = ab^x \)
  - Asymptote = x-axis, \( y = 0 \)
  - y-intercept = (0,1)
- Logarithms \( \log_b N = P \)
  - Asymptote = y-axis, \( x = 0 \)
  - x-intercept = (1,0)

**For both graphs, relate to parent function and label intercepts.**