

Show work for all problems; use the back of the sheet if necessary. Exponential and logarithmic expressions need not be simplified, but logarithms must be stated in terms of either natural or common (base 10) logarithms.

1. **(5 points)** Solve the exponential equation  $(2^{x+1})^2 = 3 \cdot 2^{x+1} + 4$ .
  
  
  
  
  
  
  
  
  
  
2. **(5 points)** Solve the logarithmic equation  $\log_5 x + \log_5(x + 1) = \log_5 20$ .
  
  
  
  
  
  
  
  
  
  
3. **(5 points)** The population of the town of Risembool is currently 600, and its population is growing at a steady rate of 2% per year. In how many years will the population reach 700?
  
  
  
  
  
  
  
  
  
  
4. **(5 points)** Find the reference number  $\hat{t}$  and the terminal point of  $t = \frac{-41}{4}\pi$ .