Name:_____ **Date**:_____

Instructions

Do the following problems on a separate sheet of paper (or two, or three, or four). You are allowed to consult the course text, the class notes, and the notes posted on the course website. You are not, however, allowed to collaborate with other students. **Write the solutions neatly and do not use multiple columns**. Staple your write-up, using this paper as the cover page.

NB. No calculators allowed. I cannot stop you from using a calculator at home, but every work you show must be producible without a calculator.

Problem 1 (2 points)**.** A colony of S. typhimurium is growing in a petri dish, quadrupling in quantity every minute. If the initial population of the colony is 500, what is the equation that models the growth of the population? Determine the time t at which the population count reaches 7800. (*Hint*: Do not use the exponential growth model.)

Problem 2 (2 points)**.** A colony of S. pneumoniae is growing in a petri dish. If the initial population is 3000 and the population after 50 minutes is 15000, what is the equation that models the growth of the population? Determine the time t at which the population count reaches 30000. (*Hint*: Use the exponential growth model.)

Problem 3 (1 point)**.** Compare the sizes of $\log_5 26$ and $\log_7 48$.

Problem 4 (1 point)**.** Compare the sizes of $e^{1.9}$ and $2^{2.59}$, using the approximation $\ln 2 \approx 0.69$.

Problem 5 (2 points)**.** Find the x- and y-intercepts of

$$y = 2 - \log_5(x + 7).$$