1. Calculate the following. *Whenever possible give the exact value. If an exact value can't be given, round to 4 decimal places. If the value does not exist, state DNE.*

A. $\log(1.035)$	B. $\log_4\left(\frac{1}{64}\right)$	C. $\log_2(-4)$	D. $\ln(e^{\pi})$	E. $\log_9(3)$

2. a) Change $y = \log_a(x)$ to log base 10. (Recall: the change of base formula)

b) Change $y = \log_a(x)$ to log base e. (Recall: the change of base formula)

3. Consider $S(D) = 0.159 + 0.118\log(D)$. S is the slope of a beach and D is the average diameter (in mm) of the sand particles on the beach. Suppose a particular beach rises 9 meters for every 100 meters inland. What size sand would you expect to find on that beach?

4. A. Sketch a graph of $y = 7^{\log_7 x}$. *Consider and include the domain in your sketch.*

B. Sketch a graph of $y = \ln e^x$.

5. You and a friend plan to purchase cars in September. The initial value of your car will be $34,000 and will depreciate 17% each year. The initial value of your friend's car will be $16,500 and will depreciate 12% each year. You agree to exchange cars when their values are equal.

A. How long do you need to wait? (to the nearest **month**) What is the value of the cars?

B. What would your depreciation rate have to be in order for the values of the cars to match at the end of 7 years? (Assume your friend's car depreciates 12% each year.)

6. It is predicted that the population of a particular state in 2005 will double by the year 2024 exponentially. Determine the annual, monthly and continuous growth rates. Write answers as a percentage with 3 decimal places. Show all work.

a) annual growth rate: _____

b) monthly growth rate: _____

c) continuous growth rate:_____