Practice problems for the Bio 242 Lab Practical

1. You do a dilution by combining 100 ml of MgCl plus 700 ml of RO water. What is the dilution factor, i.e, how many more times dilute is the MgCl?

2. You have a 100 ml stock solution of 100 mg/ml ampicillin in deionized water. You want to make 30 ml of 25 mg/ml ampicillin in deionized water. How much ampiciliin stock and how much deionized water are needed to make this? Show all your work neatly.

3. **Diagram** a three step 10^{-1} serial dilution (10^{-1} dilution at each step) starting with an unknown and using a total volume of 7 ml at each step. Determine (a) what volume of unknown you need to use at the first step and (b) the total dilution factor at each step.

4. You want to make 500 ml of 0.18 M NaCl (FW = 58.44 g/mole). What mass of NaCl do you use? Show your work.

5. If you completely evaporated 100 ml of open ocean seawater (total "salts" ~ 3.5%), approximately what mass of "salt" residues would you expect to get? (Assume all the dissolved stuff is salt.)

6. You have performed a cross between heterozygotes for two traits using *Drosophila*. The traits have simple dominance (mutant traits recessive) and you expected to get a 9:3:3:1 ratio for the two traits combined. Upon analyzing the data using chi-square, you obtain a test statistic of 4.67. (a) Use the chi-square table of critical values to determine the p-value and (b) decide whether the two traits assorted independently. Write out a sentence, as it might appear in a Results section of a scientific paper, to report the result. (Hint: *Look again at the HTW guide about reporting stats as part of results.*)

7. Table 1. Mean mass of BalbC mice fed high protein ration over 20 days. The same mass of food was provided to each mouse each day, and all food was consumed at each feeding.

Group	Ration-Type	Mean mass at start (g ± SEM (n))	Mean mass at end (g ± SEM (n))
control	Standard formula	45.4 ± 5.3 (50)	59.2 ± 3.6 (50)
treatment	High protein formula	46.1 ± 5.0 (50)	65.7 ± 3.2 (50)

a. You are trapped on a desert island without your iPhone or calculator. Your life depends on a correct interpretation of the results in Table 1. Do you believe that there was a significant change in mean mass due to the high protein diet? Defend your answer. (Hint: *Consider the amount of variability in the data*.)

b. Miracle of miracles, you find a portable PC washed up on shore and it works. Not only that, but it has statistical software on it (it belonged to a biogeek). Which statistical test would you employ to determine the significance of the difference in mean masses between the treatment and control group?

8. Using the standard curve for bovine serum albumen (BSA) shown below, determine how much crude soluble protein was in a sample that yielded an A_{595} = 0.32.