Supplement for Problem 3(c) and Problem 4

1. In problem 3(c), your solution should look like

$$P(t) = Ae^{-\frac{K}{b}e^{-bt}},$$

where $K = a - b\ln P_0$ (A is a constant that you will discover in the course of solving the problem). Note here that K depends on b! This will affect your limits in part (c), since you are told to calculate them both when $b < 0$ and when $b > 0$, so changing the sign of b may change the sign of K! Here is what you will need: In part (b), you are told to assume that $P_0 < e^{a/b}$, so that $\ln P_0 < \frac{a}{b}$. If $b > 0$, then multiplying through by b does not change the direction of the inequality, so that

$$b\ln P_0 < a.$$

If $b < 0$, then multiplying through by b DOES change the direction of the inequality, so that

$$b\ln P_0 > a.$$

What does this tell you about the sign of K? Use this to justify your limits!

2. I made a terminology error in class today, and I don't want it to mess anyone up on problem 4, especially if you've taken a chemistry class. I called the equation

$$A + 4B \rightleftharpoons C$$

a stoicheometric equation. This is inaccurate. A stoicheometric equation relates numbers of moles of a substance. This equation is relating the amounts (measured in grams) of the substances. In other words, this equation is telling you that one *grams* of A are reacting with four *grams* of B to yield one *gram* of C. So for each gram of A that is used, the reaction requires 4 grams of B.