1. Assume that the labor market is described by the following three equations. Initially set $z=1$ and also a 100% markup. There are no differences between actual prices and expected prices. Normalize the size of the labor force ($L$) to one. Finally, output, is a linear function of employment.

$$W = P^e z \log[1/u]$$
$$P = (1+m)W$$
$$Y = N$$

a. Solve for equilibrium real wages, unemployment rate, and output.
b. Assume structural change causes $z$ to double. Solve for the new equilibrium and graphically illustrate the shift in the labor market.
c. Assume the markup depends on the level of unemployment so $m=0.5(1-u)$. Why might this be the case? Solve for the new equilibrium.
d. Repeat the structural change from part b above. Solve for the new equilibrium. Is the impact on equilibrium unemployment larger or smaller? What about real wages? Discuss what is driving the differences in comparative statics between these two models of the markup.

2. Consider the following labor market from the first question where the only difference is that expected price is not necessarily the same as actual price. Markups are fixed.

$$W = P^e z \log[1/u]$$
$$P = (1+m)W$$
$$Y = N$$

a. Derive an Aggregate Supply relation (that is $P$ as a function of $Y$, given $m$, $z$, and $P^e$).
b. Now assume $P=P^e$ always. Illustrate the new Aggregate Supply curve graphically.
c. Consider the impact of expansionary monetary policy with this new Aggregate Supply curve. Compare with the impact of increasing the money supply under the curve from part a.
d. Graphically illustrate wage determination for each of the two cases above. In the first case assume $P^e=P$ and consider an increase in $P$. In the second case assume $P^e$ is fixed and consider an increase in $P$. Compare the effects on the nominal wage and unemployment rate. Discuss what is really driving the differences between these two cases?