Question from page 7 of the practice problems.

A) If he only consumes this month, he can borrow up to $\left(\frac{1}{1+r}\right) m_2$. This if he only consumes this month he can consume $m_1 + \left(\frac{1}{1+r}\right) m_2$. Likewise, if he only consumes next month, he saves all m_1 and gets back $(1+r)\, m_1$ next month. This means he can consume $(1+r)\, m_1 + m_2$ next month if he only consumes next month. Plugging in $m_1 = 4000$ and $m_2 = 5000$ we get $4000 + \left(\frac{1}{1+r}\right) 5000$ and $(1+r)\, 4000 + 5000$.

B) The intercepts are the points given above. The horizontal intercept is $4000 + \left(\frac{1}{1+r}\right) 5000$ and the vertical intercept is $(1+r)\, 4000 + 5000$. The slope of the line is $-(1+r)$.

C) The MRS is $-\frac{c_2}{c_1}$ setting this equal to the slope of the budget equation we get:

$$c_2 = (1+r)\, c_1$$

Plugging this back into the budget equation $(1+r)\, c_1 + c_2 = (1+r)\, 4000 + 5000$ we get:

$$c_1 = \frac{4000 + \left(\frac{1}{1+r}\right) 5000}{2}$$

$$c_2 = \frac{(1+r)\, 4000 + 5000}{2}$$

D) If he does not borrow or save, $c_1 = m_1$ and $c_2 = m_2$ using either of the equations above, we can solve for the r that makes this happen:

$$5000 = \frac{(1+r)\, 4000 + 5000}{2}$$

$$r = \frac{1}{4}$$

E) [This one is a little tricky]. We know this consumer cannot become a borrower. This is because, if he were to become a borrow, he would be choosing something that was *strictly affordable* to him when he chose to neither borrow nor save. He is at least as well off as he was before. Unlike in the usual case where a consumer is for instance a lender when the interest rate increases, no bundle becomes available that is obviously strictly better than the one that he was consuming. However, we know he can't be worse off because he could always just continue consuming the same point he was before.

F) Inflation was not covered in class. Don't worry about this part.

Problem on page 12.

A) The budget is a line with slope of -2 passing from the point $(0, 20)$ to the point $(10, 0)$. The indifference curves are L-shaped curves with kinks only the 45-degree line.

B) We need $x_1 = x_2$ to be consuming where the indifference curve just touches the budget line. Plugging this into the budget equation, we get:

$$x_1 = x_2 = \frac{20}{3}$$

C) Now we need a point on the budget line where $2x_1 = x_2$. Plugging this into the budget equation, we get

$$x_1 = 5, x_2 = 10$$

D) The budget line has a new intercept. The consumer could buy 30 eggs if they only bought eggs. Thus the budget line starts at $(30, 0)$ then decreases with slope -4 to the point $(10, 5)$ then returns to normal with a slope of -2.

E) Since $(5, 10)$ is still on this budget equation and there is no better point on the budget equation where $2x_1 = x_2$, this is still optimal.

Question on page 20.

A) This is a line with slope -1 passing through the points $(10, 0)$ and $(0, 10)$.

B) The new line is one with slope of -2 passing through the points $(5, 0)$ and $(0, 10)$.

C) The new budget starts at $(0, 10)$ and decreases with a slope of $-\frac{1}{2}$ to the point $(4, 8)$ then decreases with slope -1 until it gets to $(12, 0)$.

D) Greg must buy where $x_1 = x_2$ to be doing something optimal. He can buy the bundle $(4, 4)$ at the total cost of \$6 and still have \$4 left over to buy an additional 2 of each good and arrive at the bundle of $(6, 6)$.

Problem on page 25

A) This month he can consume up to $200+\frac{1}{1+\frac{1}{2}}600=600$. Next month he can consume up to $\left(1+\frac{1}{2}\right)200+600=900$.

B) The line goes through these two intercepts $(600,0)$ and $(0,900)$ and has slope $-\left(1+\frac{1}{2}\right)=-\frac{3}{2}$.

C) The tangency condition of $-\frac{c_2}{c_1}=-\frac{3}{2}$. Plugging this into the budget equation

$$\frac{3}{2}c_1+c_2=\left(1+\frac{1}{2}\right)200+600$$

Or more simply

$$\frac{3}{2}c_1+c_2=900$$

We get:

$$c_1=300, c_2=450$$

Since $c_1>m_1$, he is a borrower.

D) Since he is a borrower, if the interest rate goes down he remains a borrower and is strictly better off.

E) For a generic interest rate, the tangency condition is

$$-\frac{c_2}{c_1}=-(1+r)$$

Or

$$c_2=c_1(1+r)$$

If he neither borrows nor saves then $c_1=200$ and $c_2=600$. Let's plug these in:

$$600=200(1+r)$$

$$r=2$$