

Chapter 2 (pp 66-103)

The Classical Model

January 30, 2017

Homework due January 30, 2017

1. Continue Reading Chapter 2 of AMM, pp 82-103 (page numbers from the pdf file, book is 55-76)
2. Set up and solve the baseline model (you will have to be able to this from memory for the midterm exam).
3. Replicate Figures 2.5, 2.9, 2.10 and 2.11

Quiz 3

1. Set up and solve the baseline model (centralized). Use back of this page and solve using general parameter values for T , A_G , α and γ . Fix the capital stock at $k = 1$.
2. How do we choose values for the parameters?
3. What are some ways that an economy can grow or shift to a higher level of output?
4. What happens to c , u , l , and x when we double A_G in the baseline model?
 1. What is the income effect on l , c ?
 2. What is the substitution effect on l , c ?
5. What is a decentralized model? Why do we decentralize the model?

Given centralized model:

$$u(c, x) = \log(c) + \alpha \log(x)$$

$$T = x + l, \quad T = 1$$

$$y = f(l, k) = A_G l^\gamma k^{1-\gamma}$$

$$0 < \gamma < 1, A_G = 1, k = 1, \text{ and}$$

$$y = c$$

You should be able to solve for l , c , x , u in terms of parameters

Steps to solve

- Substitute constraints into utility function so that utility is a function of labor only
- Take FOC, derivative of Utility with respect to (wrt) labor
- Set FOC = 0 to solve for labor, l
- Substitute solution for labor into constraints to calculate solutions for leisure, x , consumption, c , and utility, u

Quiz 3, question 2 When will you choose one of the following?

- Assume arbitrary value
- Normalize
- Calibrate
- Estimate

3. What can make an economy grow?

- List factors in baseline model
- List factors not in our baseline model
- Will taxing leisure make an economy grow?

Question 4 answers and replicate figure 2.5 are same problem

- Compare solutions
- See figure 2.5

Figure 2.5 What Happens if Productivity Doubles?

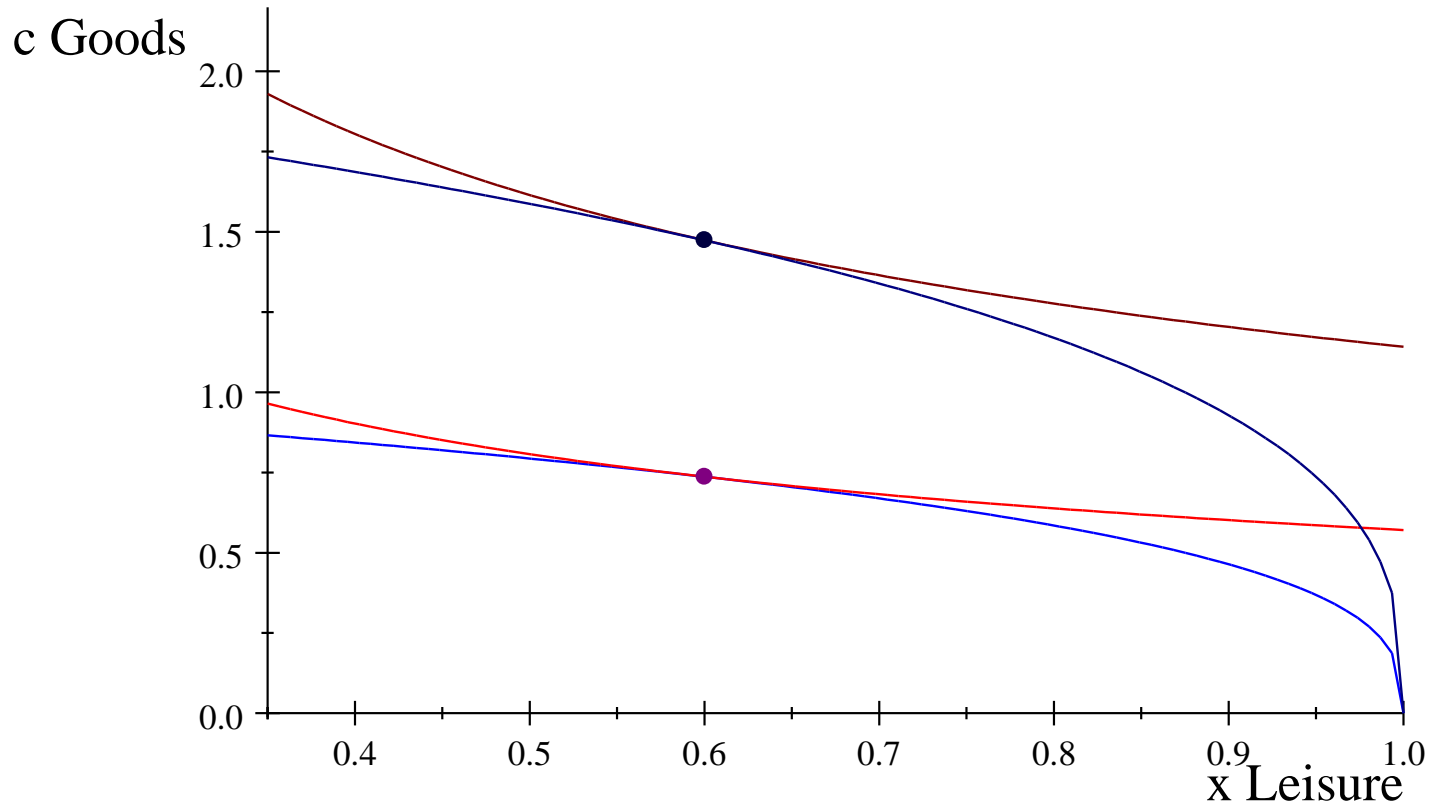
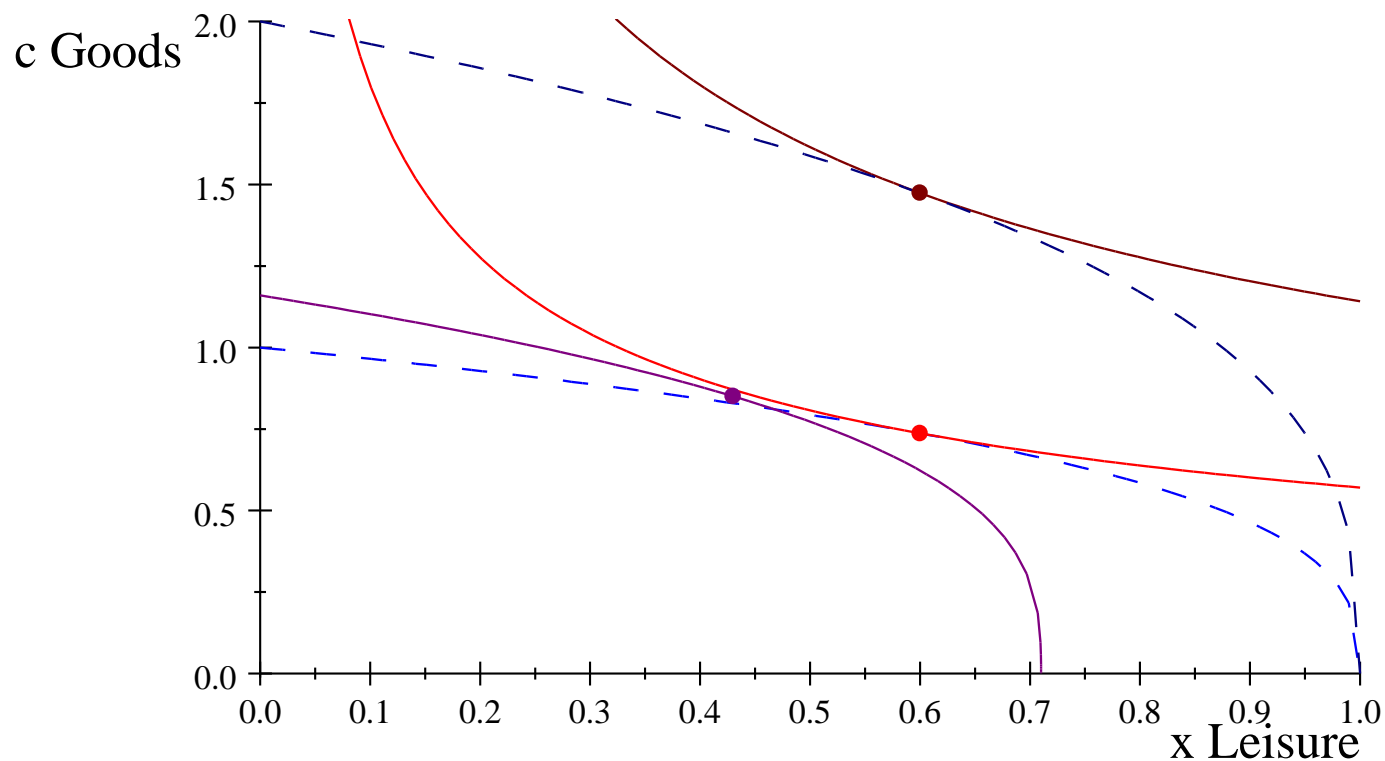


Figure 2.6. Substitution and Income Effects from a Productivity Doubling.

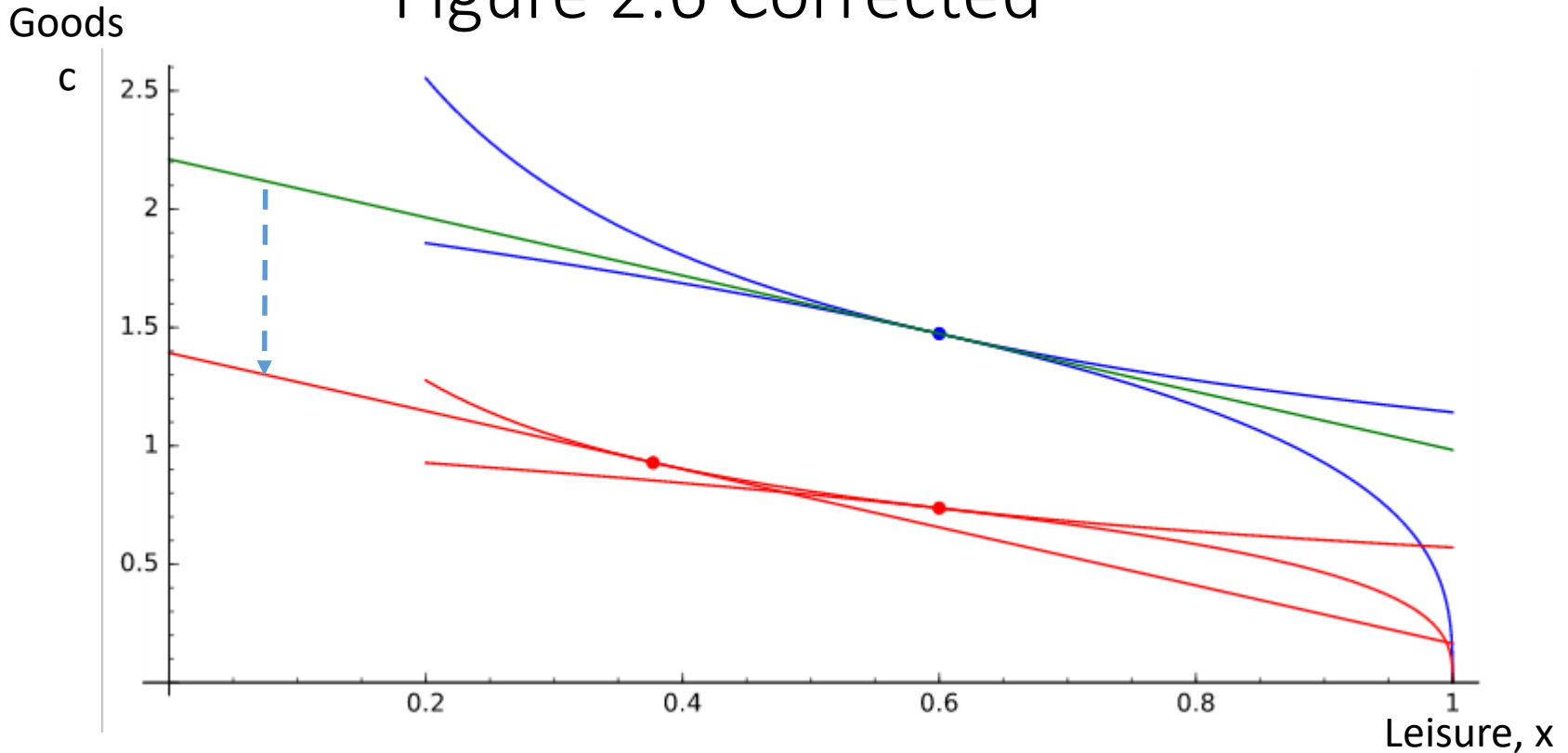


What is wrong with this figure and how would you fix it?

Figure 2.6 Corrected

- The substitution effect is caused by a change in the marginal product of labor. Calculate the MPL at the new equilibrium; that is, the slope of the tangent line through the equilibrium.
- Calculate value of x where the slope of the original utility function is equal to the new MPL.
- Then plot the tangent line when the new MPL touches the original utility function. The solution is given as:

Figure 2.6 Corrected



```

plot(e^(0.13257)/(x)^0.5, 0.2, 1)+plot(2*(1-x)^(1/3), 0.2, 1) + point( (0.6,1.474), size=30 ) +
plot(e^(-0.56058)/(x)^0.5, 0.2, 1, color='red')+plot((1-x)^(1/3), 0.2, 1, color='red') +
point( (0.6,0.737), size=30, color='red' )+
plot((-1.22801049954680)*x+ 2.21080629972808, 0 ,1, color='green')+
plot((-1.22801049954680)*x+1.39271, 0, 1, color='red')+
point( (0.377,0.929), size=30, color='red' )
    
```

Figure 2.9. Aggregate Goods Demand and Supply as a Function of $(1/w)$ in Example 2.5.

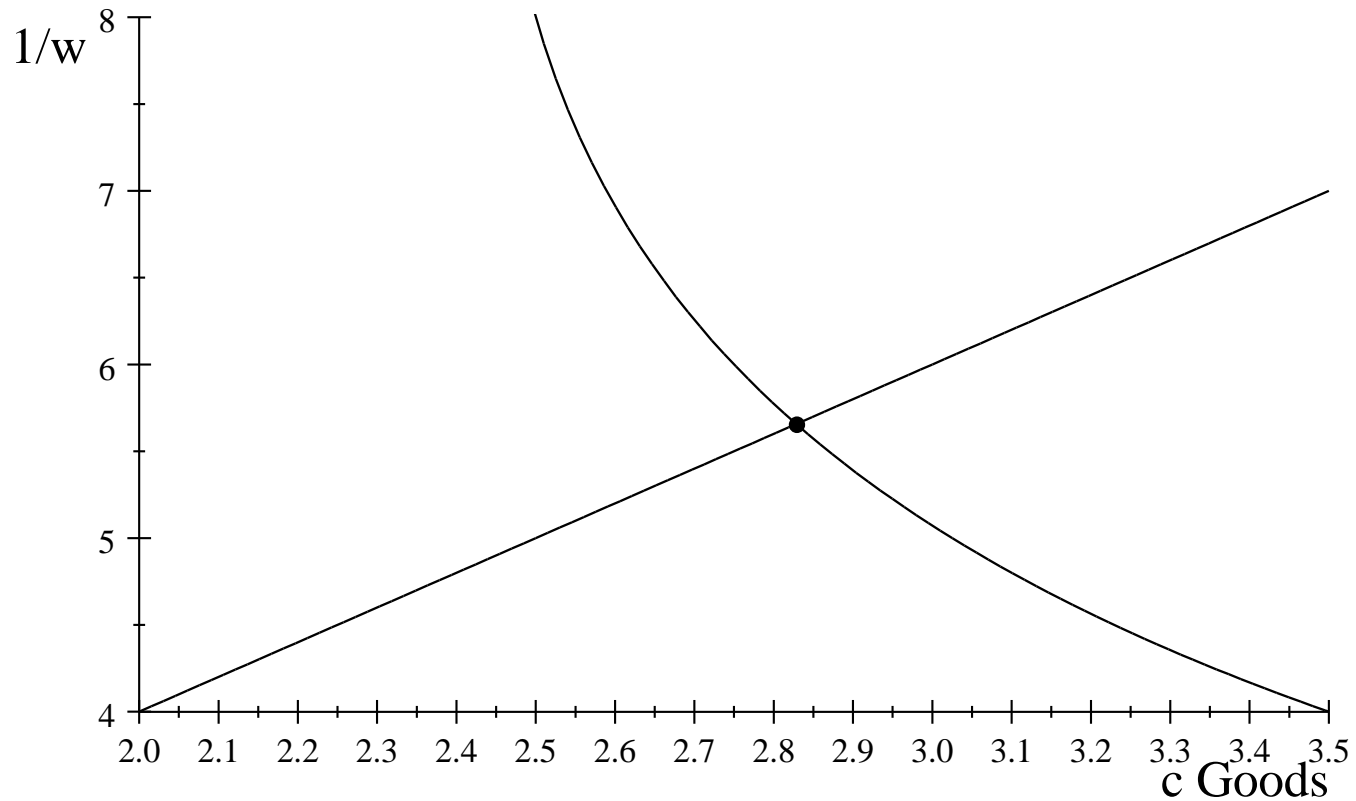


Figure 2.10. Aggregate Labor Demand and Supply as Function of w .

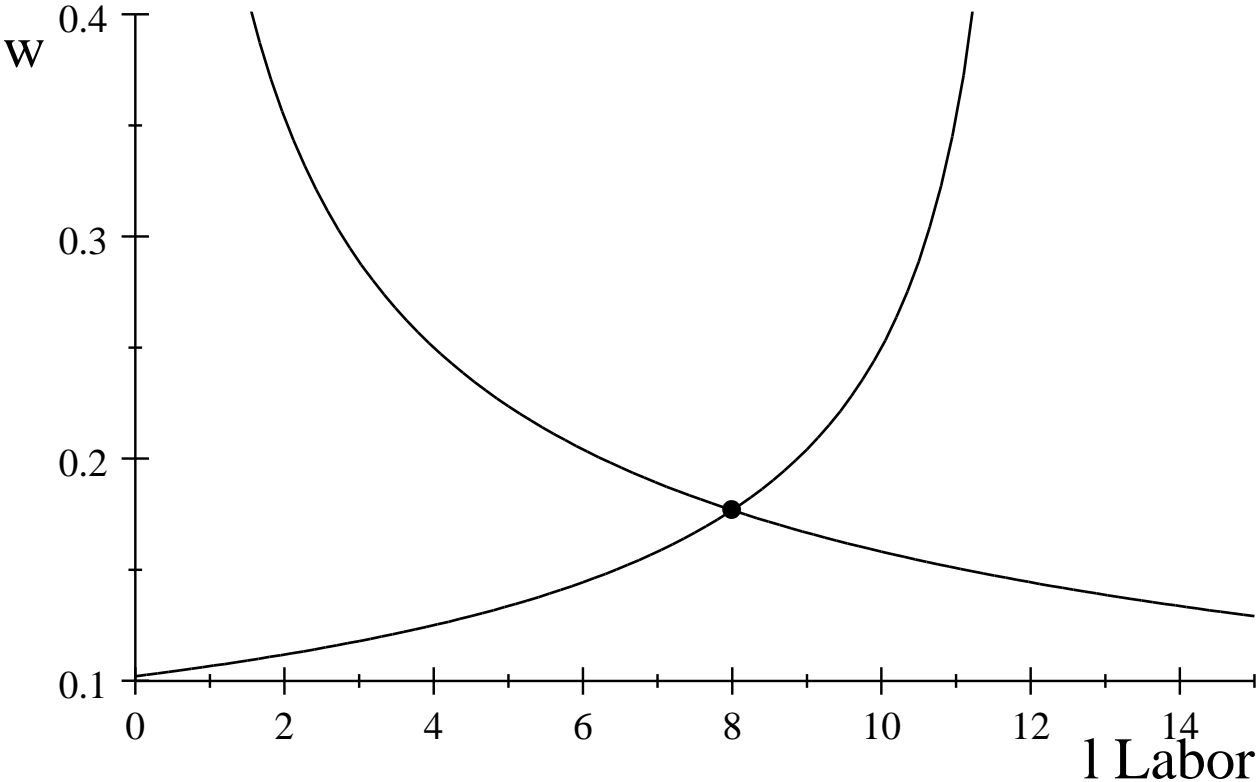
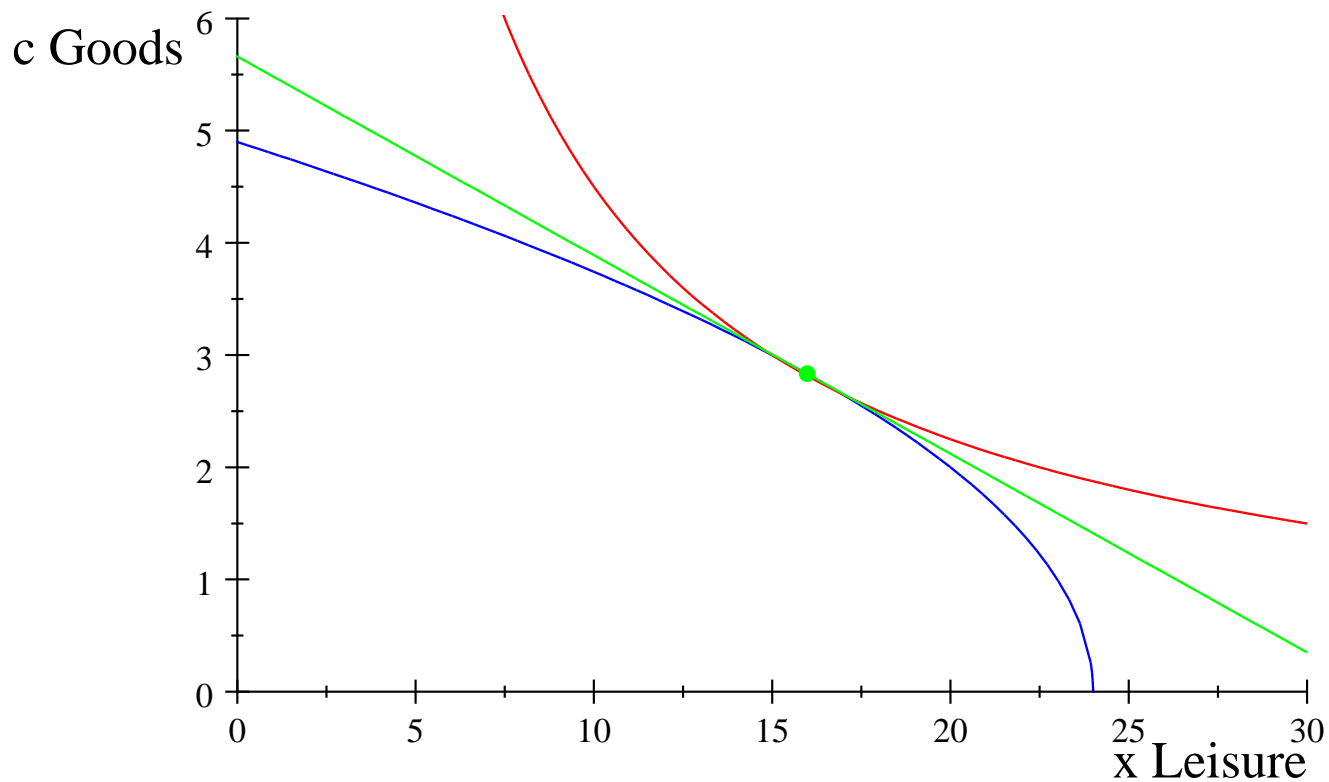


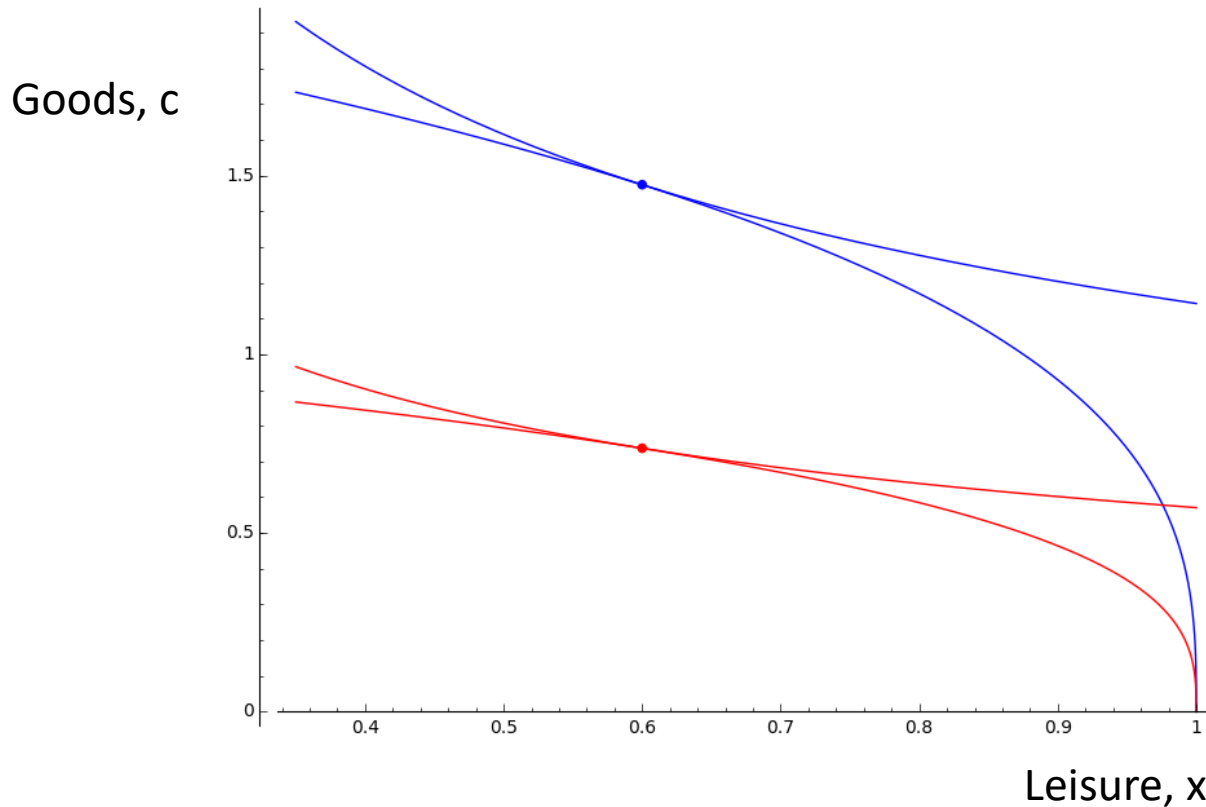
Figure 2.11. General Equilibrium Goods and Labor Market with Budget/Profit Line in Example 2.5.



Homework for Feb 1, 2017

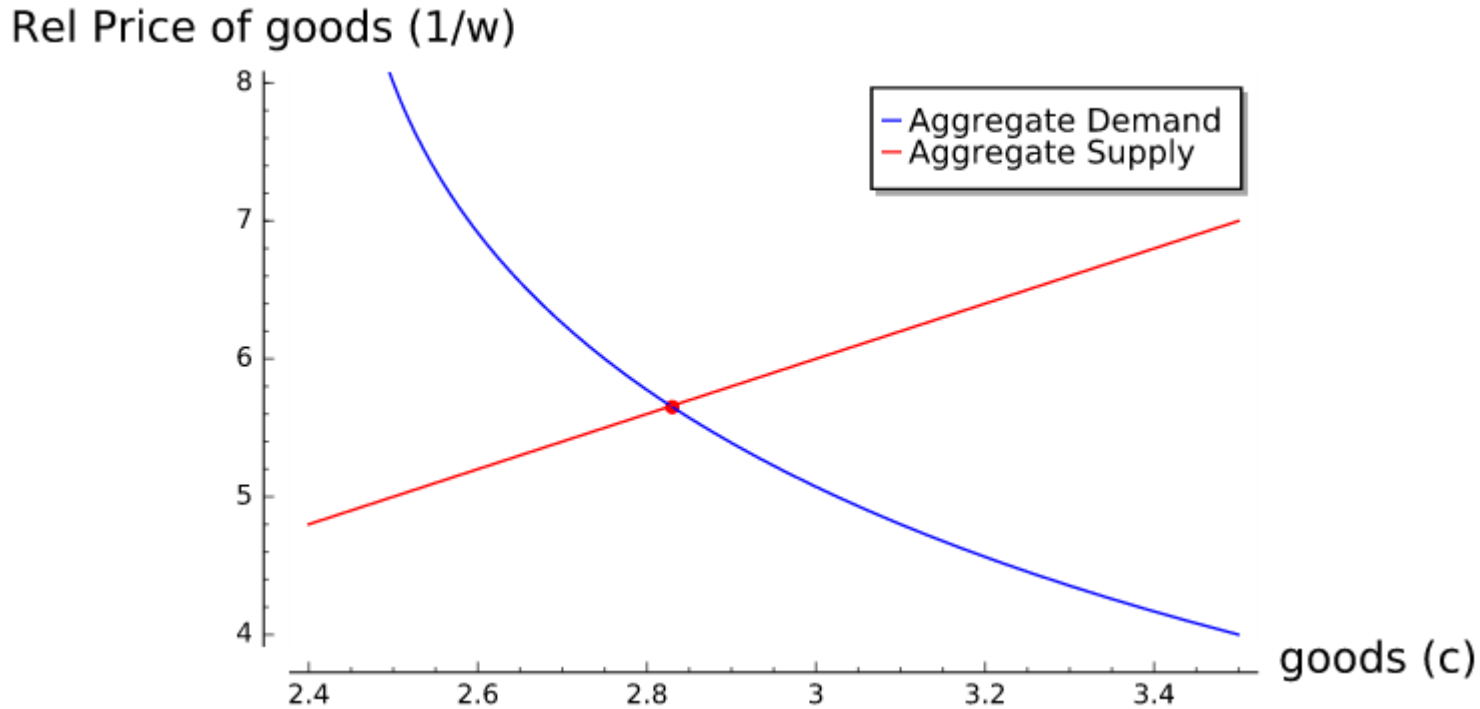
- Read AMM, pages 118 – 140
- Replicate Figures 3.1 through 3.4
- Send figures with programing (Sage or Matlab) electronically to wmgavin@gmail.com

Figure 2.5 A doubling of the productivity Factor A_G



```
plot(e^(0.13257)/(x)^0.5, 0.2, 1)+plot(2*(1-x)^(1/3), 0.2, 1) + point( (0.6,1.474),
size=30 )+plot(e^(-0.56058)/(x)^0.5, 0.2, 1, color='red')+plot((1-x)^(1/3), 0.2, 1,
color='red') + point( (0.6,0.737), size=30, color='red')
```

Figure 2.9 Aggregate Demand and Supply for Goods



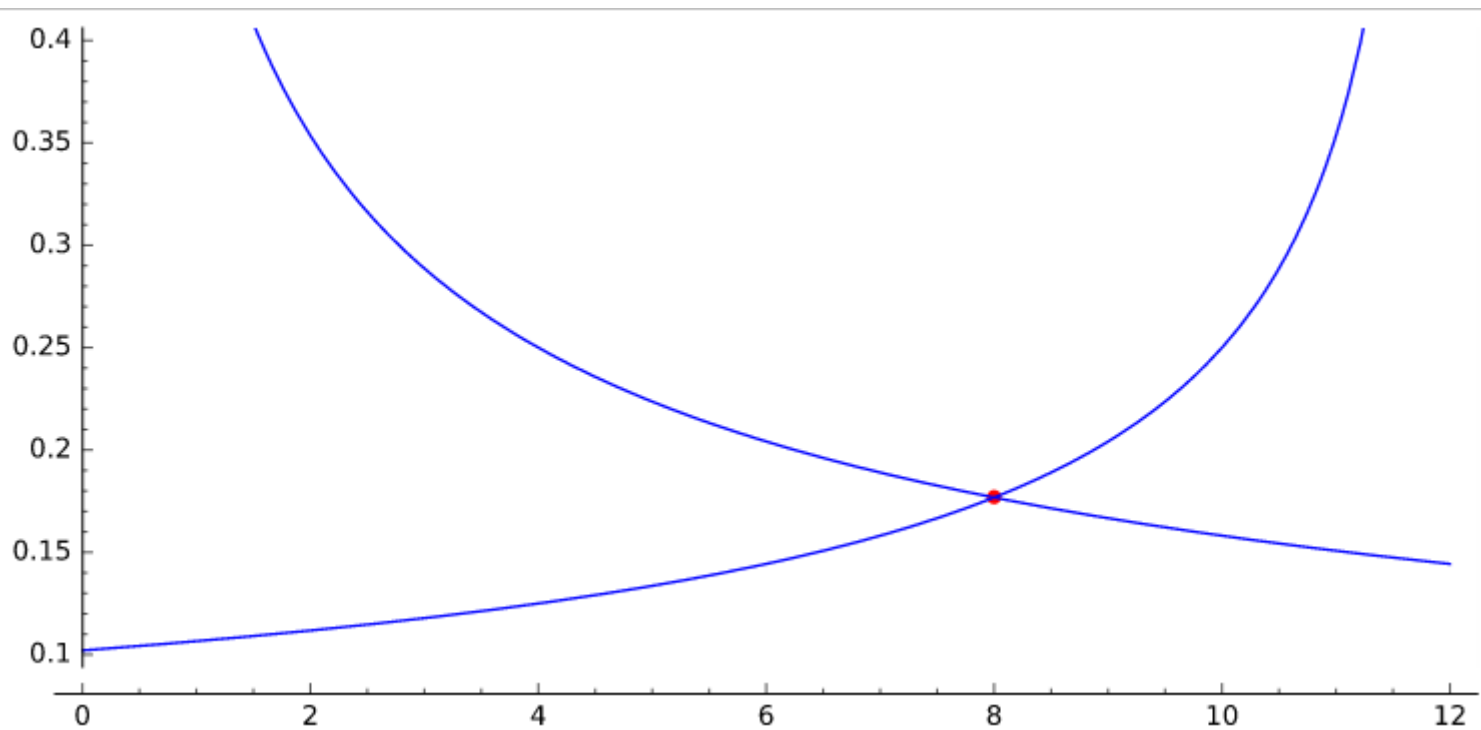
```
%var x, c
```

```
p = plot(4*c - 4*sqrt(c^2 - 6), 2.4, 3.5, legend_label='Aggregate Demand' )  
+plot(2*x, 2.4, 3.5, ymax=8, color='red', legend_label='Aggregate Supply')  
+point((2.83,5.65), size=30, color='red')
```

```
p.axes_labels(['goods (c)', 'Rel Price of goods (1/w)'])
```

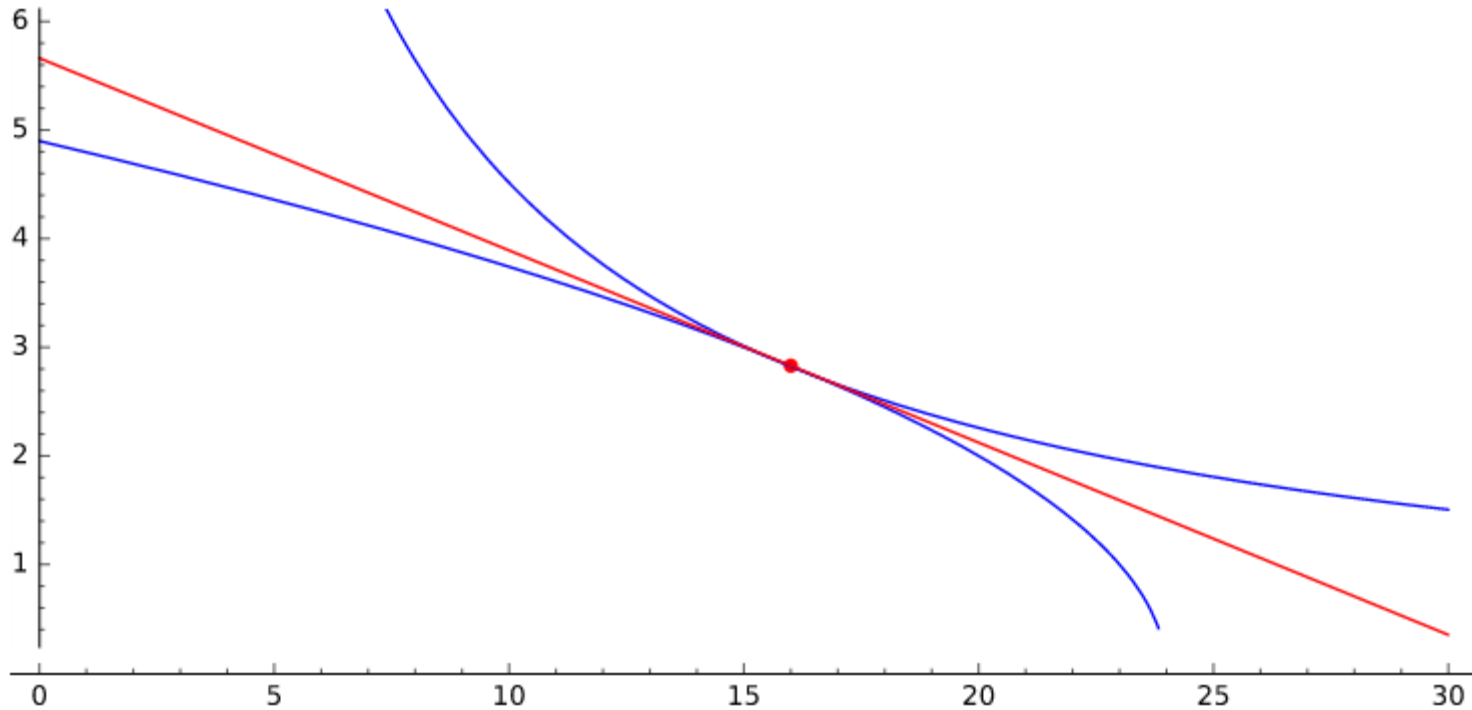
```
p.show()
```

Figure 2.10 Aggregate Labor Demand and Supply



```
plot(1/2*(1/l^.5), 0, 12, ymin=0.1, ymax=0.4)  
+ plot(1/(96-8*l)^.5, 0, 12, ymin=0.1, ymax=0.4) + point((8,.177), size=30, color='red')
```

Figure 2.11 General Equilibrium goods and labor market



```
plot((1/x)*e^3.81, 0, 30, ymax=6) + plot((24-x)^.5, 0, 30) +  
plot(-.177*x+2.83+0.177*16, 0, 30, color='red' ) +  
point((16,2.83), size=30, color='red')
```