Chapter 2
The Classical Model

January 26, 2017

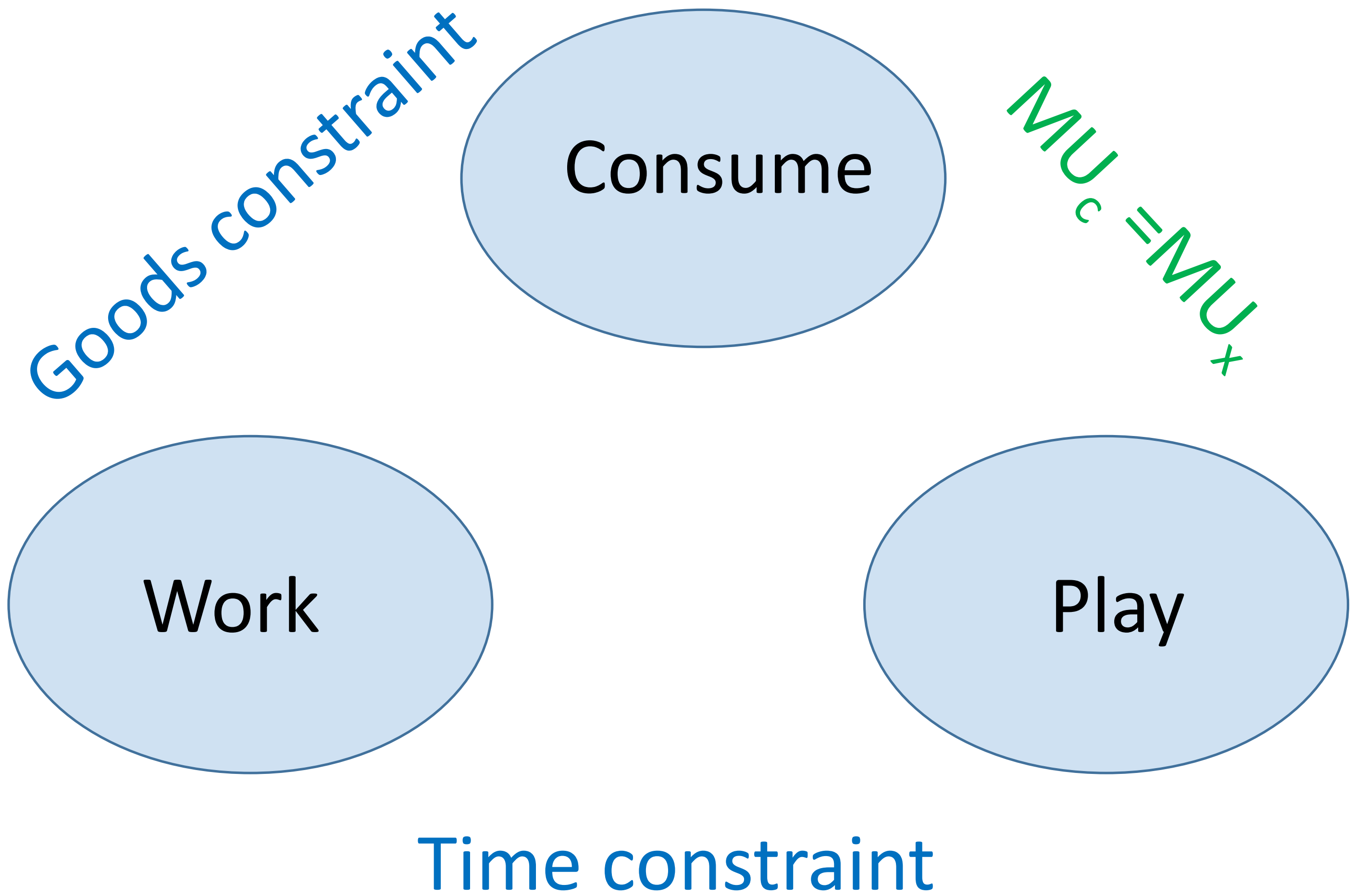
Homework due January 25, 2017

1. Read Chapter 2 of AMM
2. Replicate Figures 2.3 and 2.4 using a computer.
3. Refer to SAGE manual if you do not already use a software package that can create figures in the book. See pages

Quiz 2, the baseline model

1. What is a Robinson Crusoe Model?
2. Write the utility function of the baseline model.
3. What is consumption smoothing?
4. What is the time constraint?
5. Write the production function that represents the "Production Constraint" in the baseline model.

2. What is a Robinson Crusoe Model?



Old Testament hint for Question 3

- Hint: “Long time ago Pharaoh asked Joseph to interpret a (the Pharaoh’s) dream about seven fat and seven scrawny cattle, and--double trouble--seven fat and seven skimpy heads of grain. Joseph described the dream as a warning to make preparations for seven years of hardship, to act pre-emptively, during seven years of plenty. He ordered the granaries filled so that people would not starve when crops failed and famine hit.”

Figure 2:3. Consumption and Leisure Equilibrium at Tangency Point of Example 2:1:

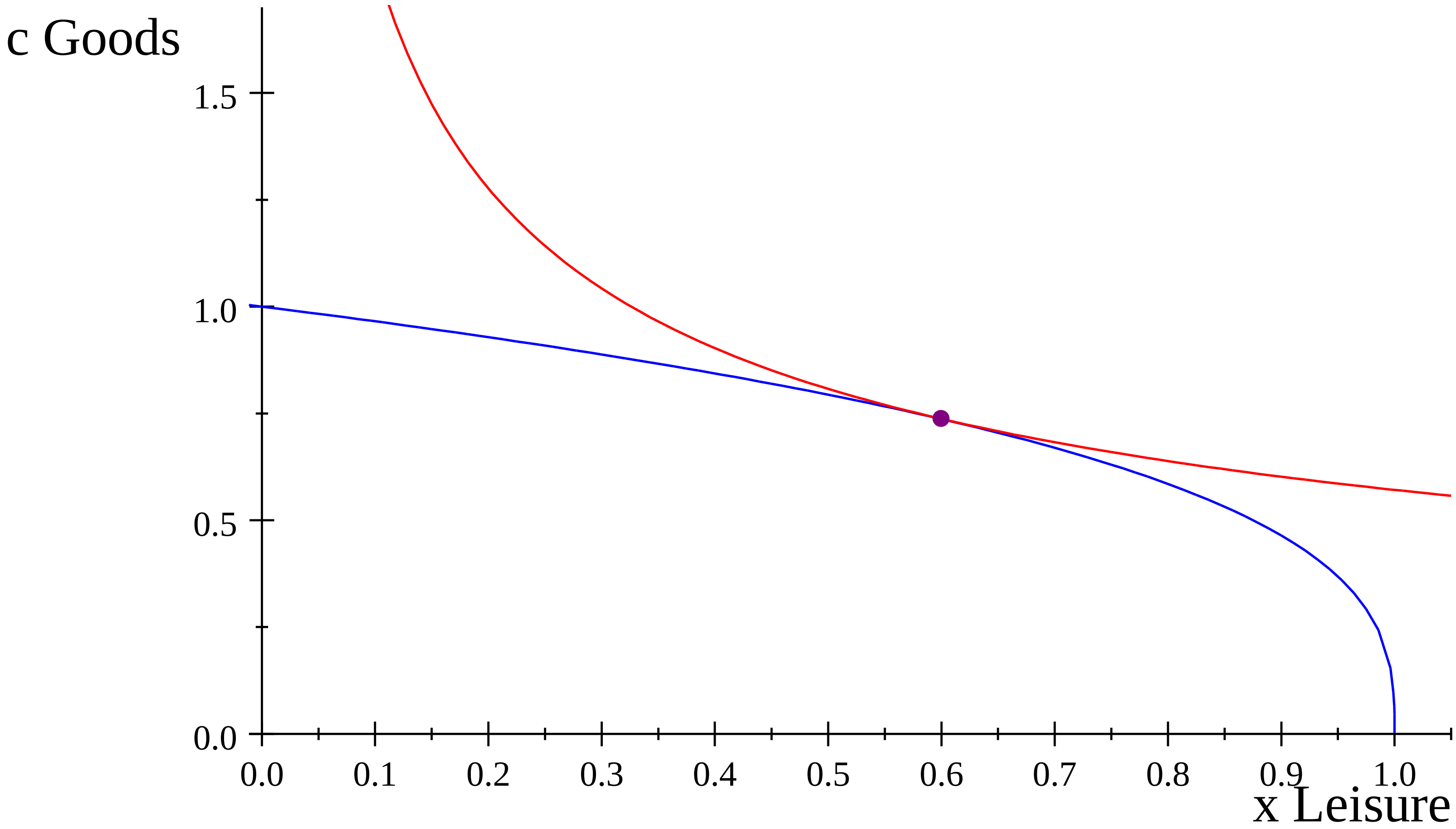
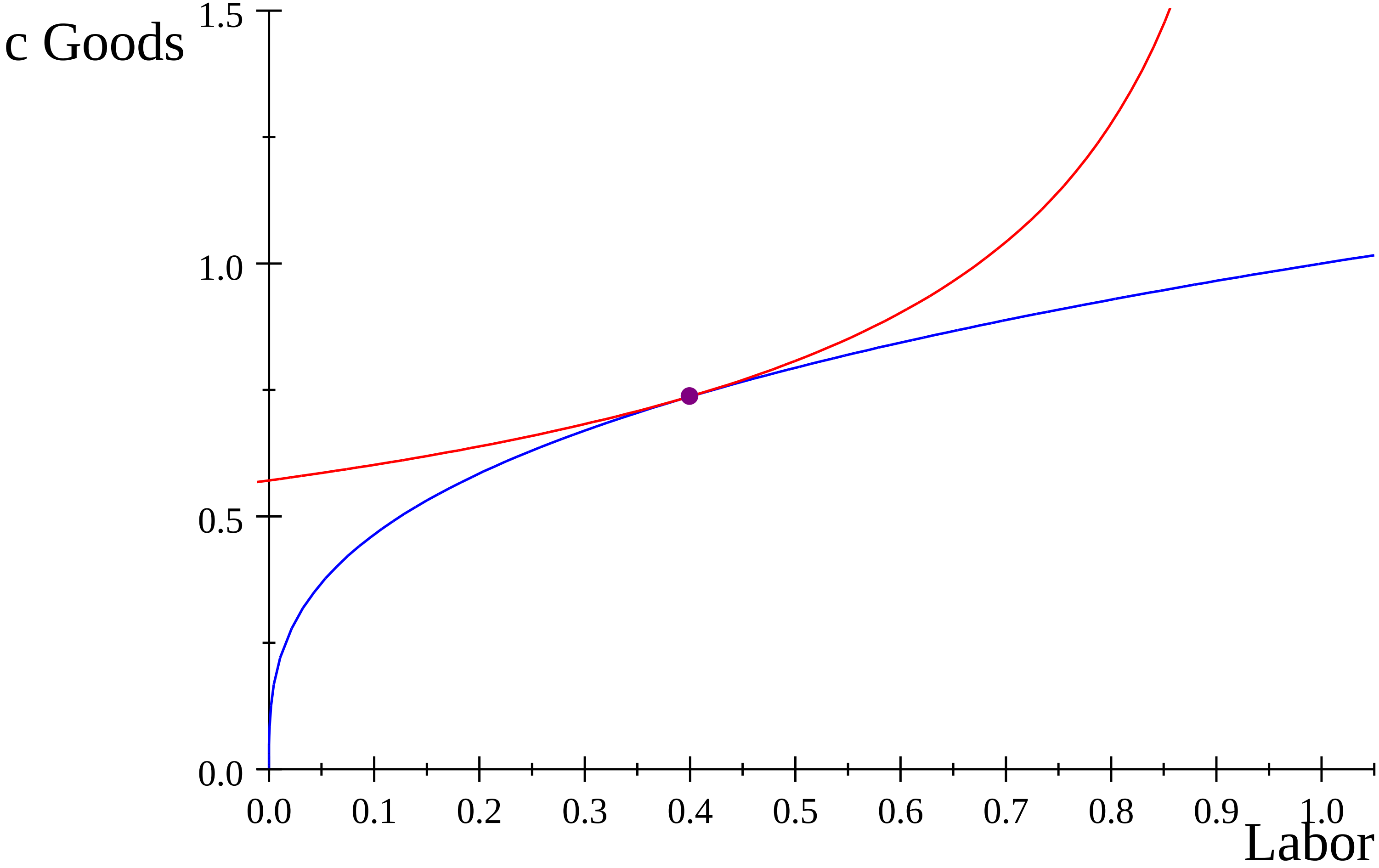


Figure 2:4. Consumption and Labor Equilibrium at Tangency Point of Example 2:1:



Solution for the baseline model: Section 2.2.3

- The book uses the substitution method.
- Use the constraints to write the utility function in terms of one variable, labor.
- Derive the first order condition for the optimal choice of labor.
- What are the margin conditions?
- Use the margin conditions to calculate the equilibrium values for l, x, c, y, and u

Set up and solve the model?

Write down a specific functional form for utility.

What are the contraints?

- Time taken up by work and leisure.
- Output produced by labor and ??? Need a specific functional form for the production of output.
- Need an assumption about the scale of output.

Given the functional forms constraints we want to maximize utility.

Write down the set up

- Utility Function
- Constaints

  Time

  Production technology

  Resource constraint
- Fix k=1
- Fix T=1

Given centralized model:

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

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

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

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

$$y = c$$

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

Do this now.

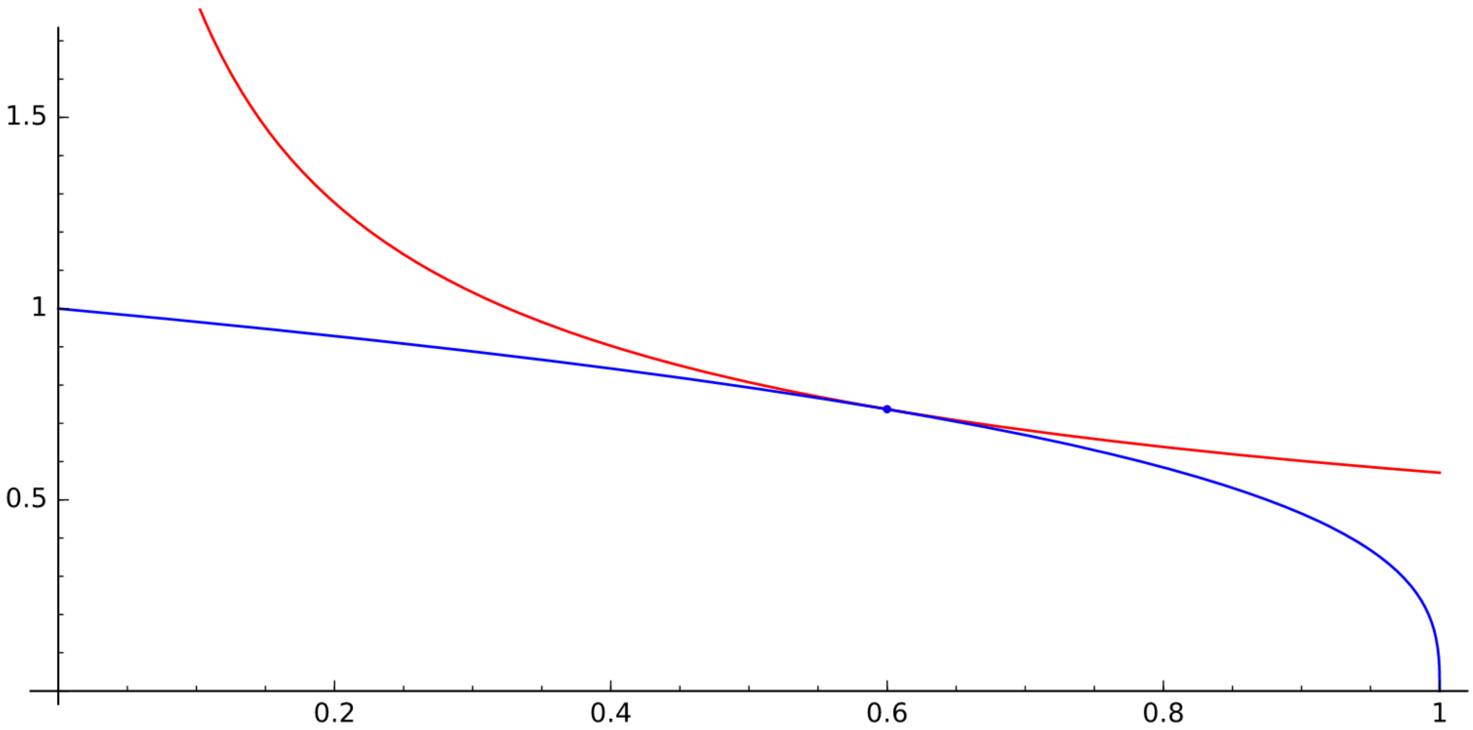
Calibrate and take FOCs

- Assume parameter values (Normalize when scale does not matter, Calibrate to hit 'targets' for some variable in the model.)
- Take FOC and set to zero
- Solve for labor
- Use constraints to solve for leisure, consumption, and utility.
- Use the utility function and production function to replicate the figures 2.3 and 2.4

Replicating 2.3 and 2.4

- Figure 2.3 is in (x,c) space
- Figure 2.4 in in (l,c) space

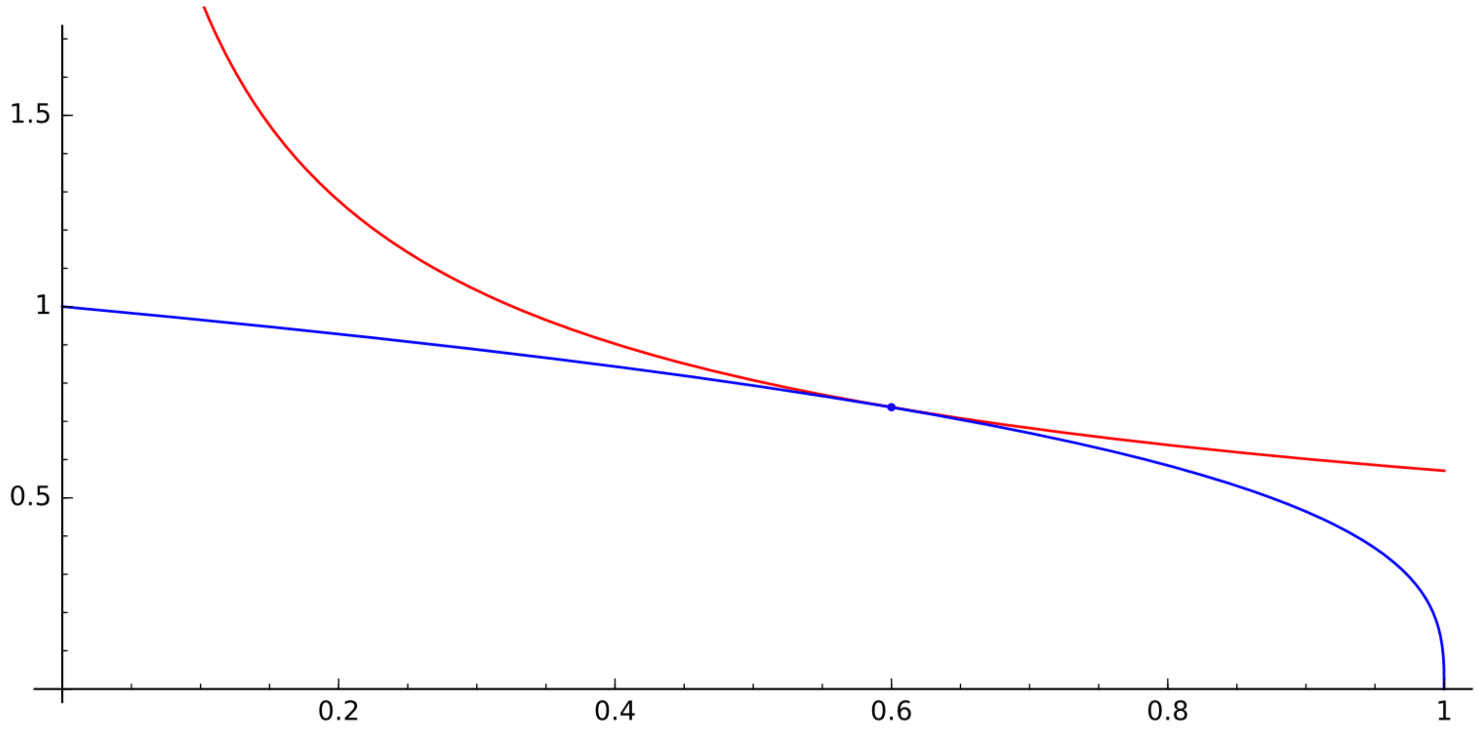
Figure 2.3



Sage command

```
plot(e^-0.56058*x^-0.5, 0, 1, ymax = 1.7, color='red')+plot((1-x)^(1/3), 0, 1)
+point([.6,0.737])
```

Figure 2.4



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plot(e^-0.56058*x^-0.5, 0, 1, ymax = 1.7, color='red')+plot((1-x)^(1/3), 0, 1)
+point([.6,0.737])
```

Homework for January 31, 2017

1. Continue Reading Chapter 2 of AMM, pp 55-76
2. Practice setting up and solving the baseline model (you will have to be able to this from memory for the midterm exam).
3. Replicate Figures 2.5, 2.6, 2.10 and 2.11