Schedule:

- HW 0.1 is due Friday, Jan 13th, 2012.
- HW 0.2 is due Tuesday, Jan 17th, 2012.
- HW 1.1-1.4 are due Friday, Jan 20th, 2012.
- Exam 1 is Monday, Feb 6th, 5:00pm-7:00pm in CB106 and CB118.

Today we will cover two linear models and go over the syllabus.
A service club has a side business stuffing envelopes.

They have a good system, stamp sponge, big boxes of envelopes

Suddenly you are in charge of scheduling

You know they could do:

- 300 envelopes in 60 minutes
- 480 envelopes in 90 minutes
- 660 envelopes in 120 minutes

How many do they stuff per minute?
How fast do they stuff?

- Known:
  - 300 envelopes / 60 minutes
  - 480 envelopes / 90 minutes
  - 660 envelopes / 120 minutes

- So what do you think?
How fast do they stuff?

- Known:
  - 300 envelopes / 60 minutes
  - 480 envelopes / 90 minutes
  - 660 envelopes / 120 minutes

- So what do you think?

- Some reasonable answers are:
  - 5 envelopes per minute
  - 5.3 envelopes per minute
  - 5.5 envelopes per minute
  - 6 envelopes per minute
How fast do they stuff?

- **Known:**
  - 300 envelopes / 60 minutes
  - 480 envelopes / 90 minutes
  - 660 envelopes / 120 minutes

- **So what do you think?**

- **Some reasonable answers are:**
  - 5 envelopes per minute
  - 5.3 envelopes per minute
  - 5.5 envelopes per minute
  - 6 envelopes per minute

- It’s weird that there is more than one answer. Oh well, back to business.
Emergency stuffing!

- The director needs 48 envelopes stuffed, pronto!
- By pronto, I mean 10 minutes.
Emergency stuffing!

- The director needs 48 envelopes stuffed, pronto!
- By pronto, I mean 10 minutes.
- Eeek! While we were talking, it is down to 9 minutes!
- Can your team get 48 envelopes done in 9 minutes?
- What do you think?
  (Left) Yes, we could totally do it in 9 at our standard rate
  (Right) In 10 we could do it at our standard rate
  (Both) We’d need magic stamp stuffing machines to get it done in under 15
Emergency stuffing!

- The director needs 48 envelopes stuffed, pronto!
- By pronto, I mean 10 minutes.
- Eeek! While we were talking, it is down to 9 minutes!
- Can your team get 48 envelopes done in 9 minutes?
- What do you think?
  
  (Left) Yes, we could totally do it in 9 at our standard rate
  
  (Right) In 10 we could do it at our standard rate
  
  (Both) We’d need magic stamp stuffing machines to get it done in under 15
  
- Talk to your neighbor, especially if you disagree. Be ready to explain your answer, especially after we vote again.
Well, that went poorly. They took 18 minutes to do it.

Did they work twice as slow? Sneaky, they looked just as busy as usual.

Oh well, last chance. How long does it take to do 900 envelopes?

What do you think?
How do predict it?

- One idea is that it takes a little bit of time to get started. Moisten the sponges, open the boxes of envelopes, get comfortable in the ergonomic stuffing chair, etc.

- Once they are good and going, it is a nice steady rate, but the first few minutes are “wasted” getting ready.

- If we use this model, then how do we predict?

- What do we need to know?
Two key quantities

- Two really important numbers are:
  - How long does it take them to get ready?
  - How many envelopes do they stuff per minute *once they are ready*
- How do we figure these two numbers out?
Finding the two numbers

- 300 envelopes in 60 minutes
- 480 envelopes in 90 minutes
Finding the two numbers

- 300 envelopes in 60 minutes
- 480 envelopes in 90 minutes
- With 30 more minutes, they stuffed 180 more envelopes
Finding the two numbers

- 300 envelopes in 60 minutes
- 480 envelopes in 90 minutes
- With 30 more minutes, they stuffed 180 more envelopes
- I guess with one more minute, they’d stuff 6 more envelopes
Finding the two numbers

- 300 envelopes in 60 minutes

- 480 envelopes in 90 minutes

- With 30 more minutes, they stuffed 180 more envelopes

- I guess with one more minute, they’d stuff 6 more envelopes

- 300 envelopes should have taken 50 minutes at 6 per minute, so the other 10 minutes were used to get ready
Finding the two numbers

- 300 envelopes in 60 minutes
- 480 envelopes in 90 minutes
- With 30 more minutes, they stuffed 180 more envelopes
- I guess with one more minute, they’d stuff 6 more envelopes
- 300 envelopes should have taken 50 minutes at 6 per minute, so the other 10 minutes were used to get ready
- Startup = 10 minutes,
  Steady rate = 6 envelopes per minute
In accounting, you keep track of assets (goods)

But assets are also tax liabilities (bads)

Old assets are like so whatever and are worth less

For example:

A printing machine is currently worth $100,000, but will be depreciated over five years to its scrap value of $30,000.

How much is the machine worth after two years?
For example:

A printing machine is currently worth $100,000, but will be depreciated over five years to its scrap value of $30,000.

How much is the machine worth after two years?
Ch 1.3: Example 1: Linear depreciation

- For example:

  A printing machine is currently worth $100,000, but will be depreciated over five years to its scrap value of $30,000.

  How much is the machine worth after two years?

- Over five years, it loses $70k of value
For example:

A printing machine is currently worth $100,000, but will be depreciated over five years to its scrap value of $30,000.

How much is the machine worth after two years?

Over five years, it loses $70k of value

Each year it loses $70k/5 = $14k of value
For example:

A printing machine is currently worth $100,000, but will be depreciated over five years to its scrap value of $30,000.

How much is the machine worth after two years?

Over five years, it loses $70k of value

Each year it loses $70k/5 = $14k of value

After two years, it loses $14k * 2 = $28k
For example:

A printing machine is currently worth $100,000, but will be depreciated over five years to its scrap value of $30,000.

How much is the machine worth after two years?

Over five years, it loses $70k of value

Each year it loses $70k/5 = $14k of value

After two years, it loses $14k \times 2 = $28k

It is worth $72k by the end of the second year
Ch 1.3: Example 1: Linear depreciation

- For example:

  A printing machine is currently worth $100,000, but will be depreciated over five years to its scrap value of $30,000.

  How much is the machine worth after two years?

- Over five years, it loses $70k of value

- Each year it loses $70k/5 = $14k of value

- After two years, it loses $14k * 2 = $28k

- It is worth $72k by the end of the second year

- Might be worth plotting it on a graph
Ch 1.3: Example 1: Linear depreciation

- This is just **slope**:

- $(x = 0, y = $100k)$ and $(x = 5, y = $30k)$ are two points on the graph

- The slope is

  \[
  \frac{100 - 30}{0 - 5} = -14 \text{ thousand dollars per year}
  \]

- The bunny hops down $14k$ every year.

- The **y-intercept** was the original $100k$ starting value
Expectations

- This is a classroom of courteous and professional peers

- The material is hard; if we already knew it, we wouldn’t be here

- We are busy people; clear deadlines are needed to budget time

- We are part of a tradition of several thousand UK students who have mastered this material over the past five years

- Class policies must be consistent across sections and years
Syllabus

- Our time is valuable; clear policies and procedures avoid waste
- The syllabus describes the policies and procedures of this course.
- Make sure you are comfortable with the absence policy, the grading policy, and the exam dates.
- Make sure you are committed to handling the time pressure:
  - Weekly homework, mandatory, no late work accepted
  - Twice weekly full class meetings, mandatory
  - Weekly small recitation meetings, mandatory
  - Monthly Monday evening exams, mandatory
Homework!

- Homework is due THIS Friday. Online.
- At 2pm, I will be in the mathskeller, CB63.
- Computers that work, assignments takes about 3 minutes
- Chapter 1 due next Friday, should take an hour if you’ve studied.