

# EC114 - INTRODUCTION TO QUANTITATIVE ECONOMICS

## TEST

23-11-2006

Do not turn this sheet over until given permission to do so.

Time allowed: 60 minutes

### Instructions:

1. Fill in the cover of your answer sheet;
2. answer all the questions, **making sure to show all your working**;
3. use of calculators is permitted (but make sure to write down the calculations);
4. do not leave your seat at the end of the test until all answer booklets have been collected and counted.

# MAKE SURE TO SHOW ALL YOUR WORKING!

## Question 1

1. [5 marks] A local bank reports that 80% of its customers maintain a checking account, 60% have a savings account, and 50% have both. If a customer is chosen at random, what is the probability the customer has either a checking or a savings account?
2. [5 marks] A coin is tossed and a 6-sided die is rolled. What is the probability of drawing a head and rolling a 3 on the die?
3. [25 marks] Some cars turn out to be “lemons”, but, unfortunately, the quality of a new car is something that cannot be ascertained until after the car has been driven several hundred miles. The unlucky purchaser of a lemon may then try to unload it by resale to someone else. Assume that 10% of all new cars are lemons and that 90% of all lemons and 5% of all nonlemons are offered for sale within the first year of ownership. If so, what fraction of all cars offered for sale within the first year are lemons?

## Question 2

[15 marks] Prior to their summer 1990 release, an independent movie industry analyst estimated the projected profits under two scenarios - hit or dud - for the three movies shown in the table below. (All data are in millions.) Assuming, unrealistically, that hit or dud are the only two possible outcomes, for each movie calculate the hit probability for which the expected value of projected profits is zero. Which of these movies has the highest required hit probability for the expected value of projected profits to be zero?

<i>Movie</i>	<i>Projected Profits</i>	
	<i>If a Hit</i>	<i>If a Dud</i>
Dick Tracy	£111	-£47
Die Hard II	£83	-£69
Total Recall	£102	-£16

### Question 3

Whirlaway claims that the useful lifetime of its dishwashers is normally distributed with a mean of three years and a standard deviation of one year.

1. *[10 marks]* If they guarantee their machines for one year, what fraction will break down within the warranty period?
2. *[10 marks]* What fraction will last more than five years?
3. *[5 marks]* If it costs Whirlaway £250 to replace a guaranteed dishwasher, how much do they have to add to the price to cover these costs?

### Question 4

A manufacturer wants to estimate the speed of its new printer. A random sample yielded the following measured speeds (characters per second):

112	120	102	107	118	131	101	97
108	114	121	116	119	99	107	110
124	113	122	104	112	103	115	110

Assuming that the standard deviation is known to be 8 characters per second:

1. *[8 marks]* construct a 95% confidence interval for the population mean;
2. *[8 marks]* construct a 99% confidence interval for the population mean;
3. *[4 marks]* is your 99% confidence interval wider or narrower than your 95% confidence interval? Explain the reason carefully;
4. *[5 marks]* if we want to halve the size of the confidence interval, then must we double the size of the sample?