

Review Questions - Fall2011
Math 150 - Exam 3 (6.2, 7, 8, 9)

Problem 1

A pediatrician is interested in how many of his patients with flu developed pneumonia as a complication. The doctor has 200 patients with flu this winter. It is estimated that 2.6% of children with flu developed pneumonia as a complication. We are interested in the number of his patients with flu who develop pneumonia.

- a) Describe the random variable and the possible values it can assume.
- b) Find the probability that 3 patients with flu develop pneumonia.
- c) Find the probability that at least 10 patients with flu will develop pneumonia.
- d) Find the probability that less than half of his patients will develop pneumonia.

Problem 2

True or False

- The total area under a normal distribution is infinite
- The z values corresponding to a number below the mean is always negative
- The standard normal distribution is a continuous distribution.
- The area under the standard normal distribution to the left of z is always negative.

Problem 3

The average number of years a person takes to complete a graduate degree program is 3 years. The standard deviation is 4 months. Assume the variable is normally distributed. If an individual enrolls in the program, find the probability that it will take ...

- a) More than 4 years to complete the program
- b) Less than 3 years to complete the program
- c) Between 3.8 and 4.5 years to complete the program
- d) Between 2.5 and 3.1 years to complete the program
- e) Less than 4 years to complete the program

Problem 4

Assume that the average life of a color TV is 8 years with a standard deviation of 1.5 years before it breaks. Suppose that a company guarantees color TV's and will replace a TV that breaks while under guarantee with a new one. However, the company does not want to replace more than 10% of the TV's under guarantee. For how long should the guarantee be made (rounded to the nearest of a year)?

Problem 5

- **MEN'S heights are normally distributed with a mean of 69 inches and a standard deviation of 2.8 inches.**
 - **Women's height are normally distributed with a mean of 63.6 and a standard deviation of 2.5 inches**
 - **The standard casket has an inside length of 78 in.**
- a) What percentage of men are too tall to fit in a standard casket, and what percentage of women are too tall to fit in a standard casket?
- b) A manufacturer of caskets wants to reduce production costs by making smaller caskets. What inside length would fit all men except the tallest 1%?

Problem 5

Please **MAKE** appropriate graph, shade appropriately when needed, and **LABEL, LABEL, LABEL!!!**

The Philadelphia Zoo reports that the mean life span of Galapagos tortoise is 100 years. Assume that their life span follows a normal distribution with mean = 100 years and standard deviation = 15

- a) Find the probability that a randomly chose tortoise will live longer that 70 years.
- b) What percentage of tortoises live longer that 125 years?
- c) What proportion of tortoises live between 115 and 145 years?
- d) Suppose that a particular zoo claims to have a tortoise older that 99% of all such tortoises. Find the age of this tortoise.
- e) A particular tortoise is 150 years old. Is this unusual? Explain why.

Problem 6 - USE THE Normal Approximation to the Binomial Distribution

In a study of 420,095 cell phone users in Denmark, it was found that 135 developed cancer of the brain or nervous system. Assuming that cell phones have no effect, there is a **0.000340 probability** of a person developing cancer of the brain or nervous system. Estimate the probability that 135 or fewer cases of such cancer in a group of 420,095.

Problem 8 - USE THE Normal Approximation to the Binomial Distribution

It is estimated that 3.5% of the general population will live past their 90th birthday. In a graduating class of 753 high school seniors, what is the probability that....

- a) 15 or more will live beyond their 90th bday?
- b) 30 or more will live beyond their 90th bday?
- c) Between 25 and 35 (inclusive) will live beyond their 90th bday?
- d) More than 40 will live beyond their 90th bday

Problem 9

The heights of 18 year-old men are approximately normally distributed, with a mean 68 inches and a standard deviation of 3 inches.

- a) What is the probability that an 18-year old man selected at random is between 67 and 69 inches tall?
- b) If a random **sample of 9** 18-year old men selected, what is the probability that the mean height is between 67 and 69 inches?
- c) If a random **sample of 50** 18-year old men selected, what is the probability that the mean height is between 67 and 69 inches?
- d) Compare your answers. Is the probability in part b) or part c) much higher or lower? Why would you expect this?

Problem 10 - Please provide a sketch with appropriate labels

According to a US Today "Snapshot", 26% of adults do not have any credit cards. A simple random sample of 500 adults is obtained.

- a) Describe the sampling distribution of sample proportions
- b) In a random sample of 500 adults, what is the probability that less than 24% do not have credit cards.
- c) In a random sample of 500 adults

Problem 11

In a recent survey of 4276 randomly selected households showed that 94% of them had telephones. Using these results, construct a 99% confidence interval estimate of the true proportion of households with telephones.

Problem 19

Do you want to own your own candy store? With some interest in running your own business and a decent credit rating, you can probably get a bank loan on startup cost for franchise such as Candy Express, The Fudge Company, Karamel Korn and Rocky Mountain Chocolate Factory. Startup costs (in thousands) from a random sample of candy stores are given below

95 173 129 95 75 94 116 100 85

Find a 90% confidence interval for the population average (mean) startup cost for candy store franchise.