CENTRAL LIMIT THEOREM

TEXT: 7.1, 7.2, 7.3

LAST NAME	FIRST NAME	DATE

1 (5 points)**.** IRS reports that the mean federal income tax paid in the year 2010 was $8040, with the standard deviation of $5000. IRS takes a random sample of 1000 tax payments.

(a) What is the approximate distribution of the sample mean?

(b) What is the probability that the sample mean is above $8000?

(c) What is the probability that the sample mean is between $7700 and $7900?

(d) What is the probability that the sample mean is less than $7950?

(e) Find the 99th percentile of the sample mean.

2 (5 points)**.** Suppose that the weight of an adult milk cow is known to have the mean of 462 kg and the standard deviation of 29 kg, but the exact distribution of the weight is unknown. When moving from farm to farm, cows are transported on a truck that can safely carry the load of up to 5000 kg.

(a) What is the probability that 1 cow weighs more than 500 kg?

(b) Suppose we load 10 random cows onto the truck. What is the approximate distribution of the sample mean weight $\overline{X}$?

(c) Find the probability that 10 cows weigh more than 5000 kg in total. [*Hint: this is the same as the probability that the mean weight in the sample exceeds* 500 *kg.*]

(d) Now suppose we load 11 random cows onto the truck. What is the mean weight in the sample, if the total weight of 11 cows is 5000 kg?

(e) What are the chances that 11 cows together weigh more than 5000 kg in total?