

Homework 1

Econ 5213

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Answer each of the following.

In problems 1 and 2 use gretl (or Stata) to compute probabilities. Question 3 requires some algebra. You can use gretl to compute the probability in part (3.b.ii).

1. Compute the following probabilities:
 - (a) If Y is distributed $N(1,4)$, find $\Pr(Y \leq 3)$.
 - (b) If Y is distributed $N(3,9)$, find $\Pr(Y > 1)$.
 - (c) If Y is distributed $N(50,25)$, find $\Pr(40 \leq Y \leq 52)$.
 - (d) If Y is distributed $N(5,2)$, find $\Pr(6 \leq Y \leq 8)$.
 - (e) If Y is distributed χ_4^2 , find $\Pr(Y \leq 7.8)$.
 - (f) If Y is distributed χ_{10}^2 , find $\Pr(Y > 18.31)$.
 - (g) If Y is distributed $F_{(10,\infty)}$, find $\Pr(Y > 1.831)$.
 - (h) Why are the answers to f and g the same?
 - (i) If Y is distributed $t_{(90)}$, find $\Pr(-1.99 \leq Y \leq 1.99)$.
 - (j) If Y is distributed $N(0,1)$, find $\Pr(-1.99 \leq Y \leq 1.99)$.
 - (k) Why are the probabilities in i and j almost the same?
2. Suppose $Y \sim (100, 43)$. \bar{Y} is the sample mean. Use the central limit theorem to answer the following.
 - (a) In a random sample of size $n = 100$, find $\Pr(\bar{Y} < 201)$.
 - (b) In a random sample of size $n = 165$, find $\Pr(\bar{Y} > 98)$.
 - (c) In a random sample of size $n = 64$, find $\Pr(101 \leq \bar{Y} \leq 103)$.

3. In any year, the weather can inflict storm damage to a home. From year to year, the damage is random. Let Y denote the dollar value of damage in any given year. Suppose that in 95% of the years $Y = \$0$, but in 5% of the years $Y = \$20,000$.
- (a) What is the mean and standard deviation of the damage in any year?
- (b) Consider an insurance pool of 100 people whose homes are sufficiently dispersed so that, in any year, the damage to different homes can be viewed as independently distributed random variables. Let \bar{Y} denote the average damage to these 100 homes in a year.
- i. What is the expected value of the average damage, \bar{Y} ?
- ii. What is the probability that \bar{Y} exceeds \$2,000?