

**Homework #4 – Due Monday, Oct. 30**  
COR1-GB.1305 – Statistics and Data Analysis

**Problem 1**

Find the probability that a standard normal random variable is:

- (a) Greater than zero
- (b) Greater than  $-1.5$
- (c) Less than  $-0.3$
- (d) Between  $-2$  and  $1$
- (e) Equal to  $1$ .

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**Problem 2**

Find a value of a standard normal random variable  $Z$  (call it  $z_0$ ) such that

- (a)  $P(Z < z_0) = .20$
- (b)  $P(Z > z_0) = .025$
- (c)  $P(-z_0 < Z < z_0) = .84$

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**Problem 3**

Suppose that  $X$  is normally distributed with mean  $11$  and standard deviation  $2$ . Find

- (a)  $P(10 < X < 12)$
- (b)  $P(X > 7.6)$ .

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**Problem 4**

A Pepsi machine in a Burger King store can be regulated so that it dispenses an average of  $\mu$  ounces per cup. If the amount dispensed is normally distributed with standard deviation  $0.2$  ounces, what should be the setting for  $\mu$  so that 8-ounce cups will overflow only  $1\%$  of the time?

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**Problem 5**

Suppose that annual stock returns for a particular company are normally distributed with a mean of 16% and a standard deviation of 10%. You are going to invest in this stock for one year. (Note: In reality, annual returns tend to be more nearly normally distributed than daily returns.) Find that the probability that your one-year return will exceed 30%.

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**Problem 6**

If the population standard deviation is 2.3 and we take a random sample of size 64, what is  $sd(\bar{X})$ ? Note: this quantity is known as the “standard error of the mean.”

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**Problem 7**

Suppose that daily returns on a portfolio are independent, with a mean of 0.03% and a standard deviation of 1%. Approximately what is the probability that the average daily return over the next 100 days will be between 0.2% and 0.3%?

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**Problem 8**

If we throw  $n$  dice where  $n$  is large, why can we think of the distribution of the sum as being approximately normal?

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**Problem 9**

Suppose that an auto factory has 10 assembly lines, operating independently. For each assembly line, the number of autos produced per day has a mean of 20 and a standard deviation of 3. Approximately what is the probability that 180 or fewer autos will be produced tomorrow?

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