GSBA 524 Homework 2
(50 points total)

1. The possible annual percentage return of the stocks of Gamma, Inc. and Delta, Inc. share a common probability distribution, given below.

Probability	Return of Gamma, Inc.	Return of Delta, Inc.
0.15	36.2	-6.4
0.15	23.4	-1.8
0.30	15.18	6.9
0.20	6.2	12.4
0.15	-2.0	16.8
0.05	-4.2	30.2

   a) What is the expected annual return of each stock?

   b) What is the standard deviation of the annual return of each stock?

   c) On the basis of your answers to parts a) and b), which of these stocks would you prefer to buy? Defend your choice.

   d) Are the annual returns of these two stocks positively or negatively associated with each other (just use your intuition, don't bother with calculations)? How might the answer to this question influence your decision to purchase shares?

2. A television cable company receives numerous phone calls throughout the day from customers reporting service troubles and from would-be subscribers to the cable network. Most of these callers are put "on hold" until a company operator is free to help them. The company has determined that the length of time a caller is on hold is normally distributed with a mean of 3.1 minutes and a standard deviation of 0.9 minutes. Company experts have decided that if as many as 5% of the callers are put on hold for 4.8 minutes or longer, more operators should be hired.

   a) What proportion of the company's callers are put on hold for at least 4.8 minutes? Should the company hire more operators?

   b) At this company, 1% of the callers are put on hold for longer than k minutes. Find k.

3. As director of a local welfare agency, you are responsible for the allocation of food stamps. You are to provide food stamps only to those households in the lowest 12 percent of the income distribution in your area. Although most income distributions are skewed right, your area's income distribution is approximately normal, with mean income of $21,340 and standard deviation of $4,980. Below what income level should food stamps be provided?

4. There is always a lot of discussion about the volatility of the Dow Jones Industrial Average (DJIA) values, so I obtained the daily closing values for the index from just before everything shut down in the US, 3/03/20, until 9/02/22. Using the adjusted daily closing prices, I calculated both the *change* and the *return* in the values. The historical averages and standard deviations are:

	Adj Close	Change	Return
mean	31,342.64	8.55	0.0004
std dev	3953.23	423.83	0.0162

Using this information (assume these values are relatively normally distributed),
a) Give a general statement explaining the standard deviations for each of the three versions of the values (Adj Close, Change, and Return).

b) What is the standardized score of the maximum closing price of $36,799.65, which occurred on 1/4/22, and what is the probability of obtaining a price above this value?

c) The closing price *change* on 3/24/20 was $2112.98. What is the Z-score of this, relative to the *change* distribution, and what is the probability of obtaining a *change* in price above this value?

d) The minimum *return* was –0.1293 on 3/16/20. What is the standardized score of this value, relative to the distribution of *returns,* and what is the probability of obtaining a return below this value?

e) Using the Empirical Rule, create 95.44% and 99.74% intervals for all 3 measures of the DJIA.

f) Would you consider these values to be extreme? Explain your answer.