1.   A quality initiative is a program of responsive customer service activated by continuously
        monitored and improved work procedures for company employees. In the course of evaluating
        the effectiveness of a new quality initiative, a company surveyed 300 employees to indicate how
        strongly they agreed or disagreed with a series of statements about the new quality initiative.
        This is a distribution of their responses:

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
60	128	82	18	12

Suppose we assign the values 1 to "Strongly Agree", 2 to "Agree", 3 to "Neither Agree nor Disagree", 4
to "Disagree" and 5 to "Strongly Disagree". Please fill out the outcomes and probabilities in the table
below and then answer the following questions:

a. (4 points)

f(x)	1	2	3	4	5
p(x)	.20	.43	.27	.06	.04

b.   (3 points) What is the probability that a randomly selected employee will agree or strongly agree
        with the new quality initiative?

$$(.43) + (.20) = .63 \text{ or } 63\%$$

c.   (3 points) What is the probability that 3 employees, all selected at random, will agree with the
        new quality initiative? Assume employee opinions are independent.

$$(.43)^3 \text{ or } \approx 7.95\%$$

2. A large university with a total enrollment of about 50,000 students has offered Pepsi Cola a contract to sell their products at all university facilities. Currently, Coca-Cola has an exclusive contract, but this will change if Pepsi accepts the offer.

Pepsi is faced with a problem, they do not know how many soft drinks are sold weekly at the university. Their regional vice president of sales believes that their share will be one soft drink a week per student if they accept the contract. This estimate is based on their past experiences at other campuses which also sell both Pepsi and Coke. Coca-Cola is unwilling to share their information on sales with Pepsi at this university.

The business school suggests that a survey of students will provide information about soft drink sales on the campus. Accordingly, a survey is performed that asks 500 students (selected at random from computerized enrollment lists) how many soft drinks they purchase on campus in a week. From the survey, the average number of soft drinks purchased on campus in a week was 3.4 with a standard deviation of 2.2.

Please answer the following questions:

a. (2 points) The parameter is:
   i. 50,000 students
   ii. 50,000 soft drinks ← *either one*
   iii. 500 students
   iv. 3.4 soft drinks
   v. impossible to estimate

b. (2 points) The statistic is:
   i. 50,000 students
   ii. 50,000 soft drinks
   iii. 500 students
   iv. 3.4 soft drinks
   v. 3.4 * 50,000 or 170,000 soft drinks

c. (2 points) The population is:
   i. 50,000 students
   ii. 50,000 soft drinks
   iii. 500 students
   iv. 3.4 * 50,000 or 170,000 soft drinks
   v. impossible to estimate

d. (2 points) The sample is:
   i. 50,000 students
   ii. 50,000 soft drinks
   iii. 500 students
   iv. 3.4 soft drinks
   v. 3.4 * 50,000 or 170,000 soft drinks

e. (2 points) This study is:
   i. a Randomized Controlled Experiment
   ii. a Randomized Experiment without Controls
   iii. an Observational Study
   iv. an Observational Study with multistage sampling

3. Al and Larry are mutual fund managers.   Al's fund FDCHR has a one-year return of -9% (a loss).   Larry's fund TRSEC has a one-year return of 2% (a gain). The 6,000 mutual funds reported by the Wall Street Journal are normally distributed with a mean one-year return of -3% and a standard deviation of 8%

a.   What percentage of mutual funds had returns between Al's & Larry's funds? (3 points)
      i.   About 38.15%
      ii.   About 50.91%
      iii.   About 51.51%
      iv.   About 73.57%
      v.   About 96.23%

b.   What are the returns for funds at the 25th percentile and at the 75th percentile? (3 points)
      i.   -8.36% and 2.36%
      ii.   -2.36% and 8.36%
      iii.   -1% and +3%
      iv.   -.67% and +.67%
      v.   +.25% and +.75%

c.   My financial adviser believes inflation should be taken into account when measuring fund performance. Suppose he adjusts all of the fund returns by subtracting 2% and then multiplying by 4. For example, Al's fund would now return -44% (a loss). I need a return of 4% or more for a fund to qualify as investment quality. What percentage of all funds qualify? (4 points)
      i.   about 15.87%
      ii.   about 22.66%
      iii.   about 77.34%
      iv.   about 84.13%
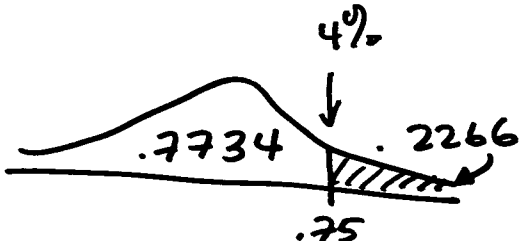   v.   this cannot be calculated from the information provided

a.

$$\frac{2-(-3)}{8} = .63 = z = .7357$$

$$\frac{-9-(-3)}{8} = -.75 = z = \frac{.2266}{.5091}$$

b.

$$-.67 = \frac{x-(-3)}{8} \quad \text{solve for } x = -8.36$$

$$+.67 = \frac{x-(-3)}{8} \quad \text{solve for } x = 2.36$$

c.

$$\frac{4-(-20)}{32} = .75$$

4%
.7734   .2266
.75

4.   Answer True or False about the properties of histograms that are used to describe large datasets (1 point each)

True	False	Property
✓		Relative frequencies are labeled on the vertical scale
✓		The relative frequencies of all classes total 100%
	✓	They cannot be used to compare distributions with different numbers of observations
	✓	The horizontal scale is optional
✓		They do not display actual values of data

5.The result of issuing a command in Stata:

```
.summarize salesgro, detail
```

```
                            SALES GROWTH
-----------------------------------------------------------------
           Percentiles       Smallest
  1%          -16.4           -55.89
  5%          -6.31           -21.46
 10%          -2.71           -20.76        Obs               496
 25%           2              -17.25        Sum of Wgt.       496

 50%          7.285                         Mean          11.47891
                             Largest        Std. Dev.     18.60074
 75%         16.44           102.82
 90%         29.21           108.45         Variance      345.9876
 95%         40.62           115.37         Skewness      3.695789
 99%         96.73           201.44         Kurtosis      30.06029
```

Please answer the following questions regarding the results:

a.   Based on the values of the mean and median, what can you say about the shape of the distribution of the Sales Growth variable? (3 points)
       i.   It is symmetric around 11.47891
       ii. It is left-skewed with its mean > median
       iii. It is right-skewed with its mean > median
       iv. It is left-skewed with its mean < median
       v.   It is right skewed with its mean < median

b.   Please give the five-number summary for the Sales Growth Variable, just list the values in order from lowest to highest. (3 points)

       $-55.89, \ 2, \ 7.285, \ 16.44, \ 201.44$

c.   Please give the interquartile range for the Sales Growth Variable. If it is not possible to give this statistic, please write "not possible" below and on your answer sheet. (4 points)

       $Q_3 - Q_1 = IQR$

       $16.44 - 2 = 14.44$