Name: _____ Date: _____

Service time measurements

Service times (minutes): 6, 7, 8, 8, 9, 10, 10, 10, 11, 12, 12, 13, 14, 15, 40. Use the median excluded quartile convention and the ordinary 1.5 IQR outlier rule.

(a) Find the five number summary. Leave the median out of both halves when finding quartiles.

(b) Find the IQR and the two 1.5 IQR fences. Identify any outliers.

(c) Draw a modified boxplot. Label the median and the whisker endpoints. Show outliers separately.

Data values

(d) Describe the tail pattern and choose a suitable measure of center. What information does the boxplot hide?

Waiting time set 1

Waiting times have been grouped into equal width classes. Each lower boundary is included; each upper boundary is excluded.

Time (minutes)	Frequency	Relative frequency
10 <= x < 20	2	
20 <= x < 30	6	
30 <= x < 40	14	
40 <= x < 50	6	
50 <= x < 60	2	

(a) Complete the relative frequency column as decimals rounded to four places. State the exact and rounded totals.

(b) Draw a frequency histogram with touching bars. Label both axes.



(c) Describe the shape. Which class contains a waiting time of 30 minutes?

(d) Estimate the mean with class midpoints. Can you recover the exact raw mean or exact median from this table alone?

Two study methods

A college wants to compare two study methods for all 480 students in its introductory statistics course. It randomly selects 60 of these students, then randomly assigns 30 to video practice and 30 to workbook practice. After two weeks, every selected student takes the same 100 point quiz. The response is the quiz score.

(a) Is this an experiment or an observational study? Explain.

(b) Identify the population, sample, explanatory variable and response variable.

(c) Explain what random selection and random assignment each help justify. Do they guarantee a better score?

Choose the whole group

Participants attended a workshop at one of four centers. Use the same table for every part. Select one participant at random from the group named in each prompt.

Center	Completed	Did not complete	Total
North	14	6	20
South	9	11	20
East	18	12	30
West	9	1	10
Total	50	30	80

(a) A participant is chosen from ALL 80 participants. What is the probability that the participant is from East AND completed the workshop? Round to four decimal places.

(b) A participant is chosen ONLY from East. What is the probability that the participant completed the workshop? Round to four decimal places.

(c) A participant is chosen ONLY from those who completed. What is the probability that the participant is from East? Round to four decimal places.

(d) A participant is chosen from ALL 80 participants. What is the probability that the participant is from East OR completed, or both? Round to four decimal places.

Workshop comparison 2

Use this workshop table to compare completion rates. All rows have positive totals. The table gives no information about assignment to centers.

Center	Completed	Did not complete	Total
North	18	12	30
South	12	8	20
East	6	4	10
West	24	16	40
Total	60	40	100

(a) Find the overall probability of completion, rounded to four decimal places.

(b) Find the completion probability within EACH center, rounded to four decimal places.

(c) Are center and completion independent in this table? Compare at least two conditional probabilities with the overall probability.

(d) Can this table establish that the center CAUSED a change in completion? Explain.