

For questions 1-10, choose one correct answer for each question. (5 points each)

1. Except for rounding errors, relative frequencies should add up to what sum?
(A) 0 (B) 1 (C) 50 (D) 100 (E) None of the above
2. What is the area under the standard normal curve between $z = -0.5$ and $z = 1.38$?
(A) 0.2247 (B) 0.4767 (C) 0.6077 (D) 0.6138
3. A single extremely large value can affect the median more than the mean. (T/F) (F)
4. A recent poll states that 35% of all American adults are overweight. If 4 adults are selected at random, what is the probability that at least one adult is overweight?
(A) 0.015 (B) 0.985 (C) 0.179 (D) 0.821
5. When a distribution is bell-shaped, approximately what percentage of data values will fall within one standard deviation of the mean?
(A) 50 (B) 68 (C) 95 (D) 99.7 (E) None of the above
6. A sample of 36 different payroll departments found that the employees worked an average of 242.5 days a year with a standard deviation of 21.2 days. What is the 90% confidence interval for the average days worked, μ , of all payroll departments?
(A) (241.5, 243.5) (B) (238.0, 247.0) (C) (235.6, 249.4) (D) (236.7, 248.3)
7. In a Calculus class there are 11 freshmen and 15 sophomores; 5 of the sophomores are females, and 8 of the freshmen are males. If a student is selected at random, what is the probability of selecting a freshman or a female?
(A) 19/26 (B) 3/26 (C) 9/13 (D) 8/13
8. What type of data is provided by a person's marital status?
 (A) Qualitative (B) Quantitative
9. The probability that Mary will visit Walt Disney World is 0.35, the probability that she will visit Epcot Center is 0.7. The probability that she will visit both places is 0.42. What is the probability that Mary visits Walt Disney World or Epcot Center?
(A) 0.42 (B) 0.07 (C) 0.28 (D) 1.35 (E) 0.63
10. In a small sporting goods store there are 3 managers, 8 salesmen, and 5 cashiers. If a person is selected at random, what is the probability that the person is a cashier or a manager?
(A) 5/16 (B) 1/2 (C) 11/16 (D) 13/16 (E) None of the above

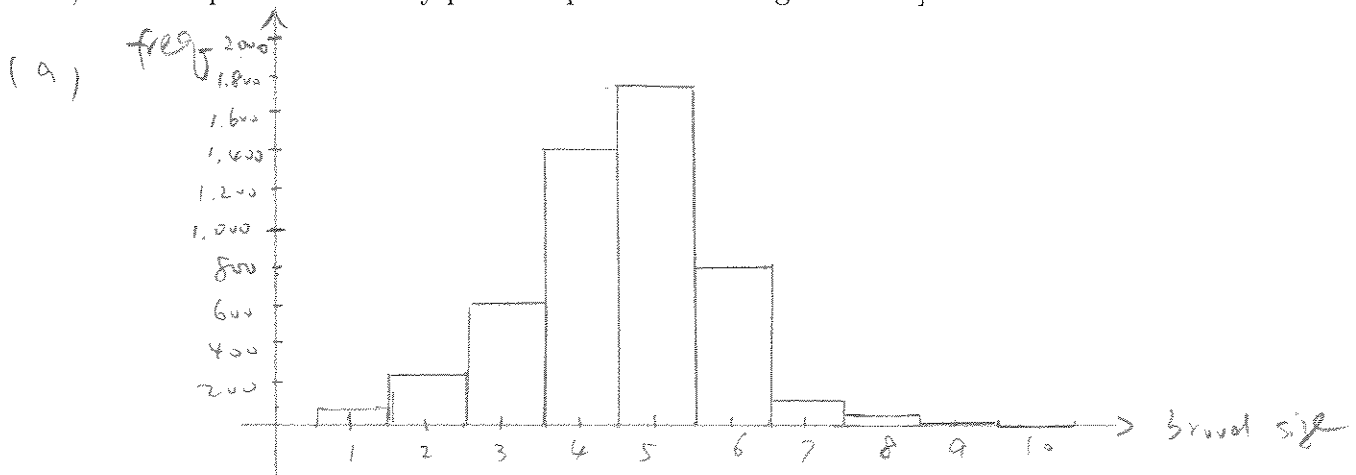
Show all work for the following two problems. Answers with no necessary steps will not receive any credit.

11. (20 points) In a certain population of the European starling, there are 5,000 nests with young. The distribution of brood size (number of young in a nest) is given in the accompanying table.

Brood Size	Frequency (number of Broods)	
1	90	90
2	230	320
3	610	930
4	1,400	2330
5	1,760	4090
6	750	4840
7	130	4970
8	26	4996
9	3	4999
10	1	5000
	5,000	

a. (10 points) Construct a histogram based on the frequency distribution.

b. (10 points) Calculate the quartiles (Q_1, M, Q_3) for this data set. [Hint: there are 5,000 data points. You may provide quartiles as integer values.]



(b)

$Q_1 = 4.$

$M = 5.$

$Q_3 = 5$

12. (30 points) In the US, 85% of the population has Rh positive blood. Suppose we take a random sample of 6 persons and let Y denote the number of persons, out of 6, with Rh positive blood.

a. (5 points) What is the distribution of Y ? Please name the distribution and provide the parameter values for the distribution.

b. (10 points) What is the probability that Y is less than 6?

c. (15 points) Suppose 100 persons are randomly selected from the US population. What is the probability that there are fewer than 80 persons with Rh positive blood in a sample of 100?

$$(a) \quad Y \sim \text{Bin}(6, 0.85)$$

$$(b) \quad P(Y < 6) = 1 - P(Y = 6) = 1 - \binom{6}{6} 0.85^6 0.15^0 \\ = 1 - 0.85^6 = 0.623$$

$$(c) \quad Y = \# \text{ people w/ Rh positive blood out of 100} \\ \sim \text{Bin}(100, 0.85) \approx N(85, 12.75)$$

$$\left. \begin{aligned} n\pi &= 100 \times 0.85 = 85 \geq 5 \\ n(1-\pi) &= 100 \times 0.15 = 15 \geq 5 \end{aligned} \right\} \text{ large sample}$$

$$\mu = n\pi = 100 \times 0.85 = 85$$

$$\sigma^2 = n\pi(1-\pi) = 100 \times 0.85 \times 0.15 = 12.75$$

$$P(Y < 80) = P\left(\frac{Y - 85}{\sqrt{12.75}} < \frac{80 - 85}{\sqrt{12.75}}\right)$$

$$= P(Z < -1.4)$$

$$= 0.0808$$