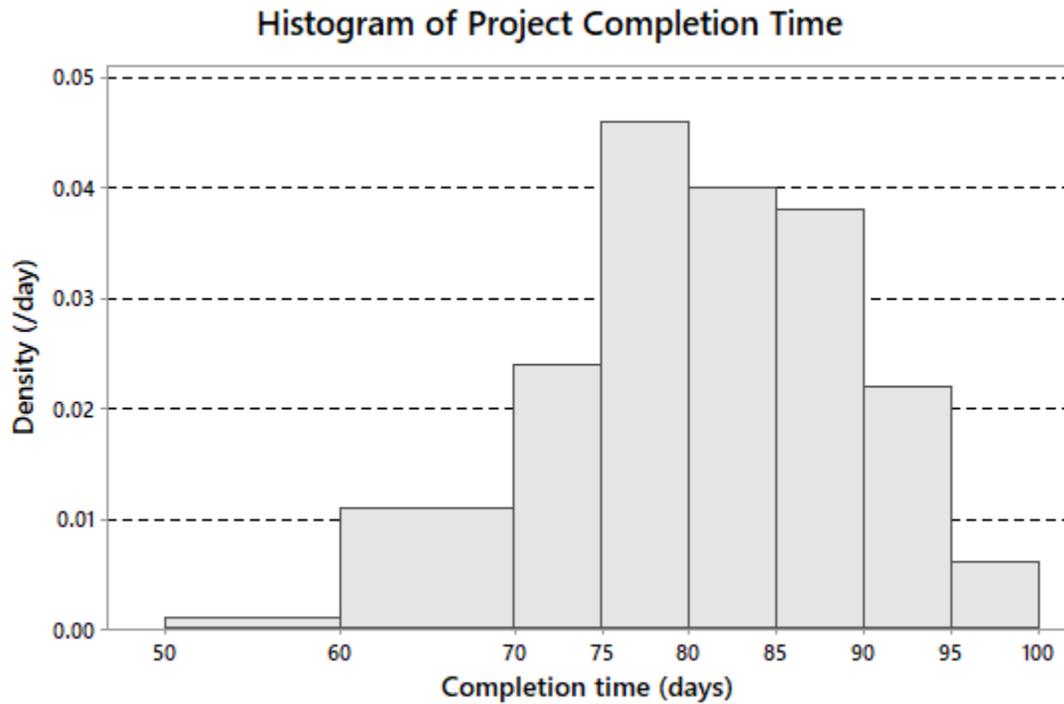


ENGI 4421
Term Test 1
2020 June 11

1. A random sample of 100 contractors for a certain type of design project returns the following summary data and histogram for completion times (t , in days).

Variable	N	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Completion time	100	80.07	8.50	51	75	80	86	97



- (a) Find the modal class [2]
(b) Find the frequency of the class $60 \leq t < 70$ (days) [5]
(c) Is the minimum value of 51 days an extreme outlier, a mild outlier, or not an outlier at all? Show your working. [8]
-

2. Given the information for the three events A, B, C

$$P[A] = .50, \quad P[B] = .46, \quad P[C] = .40, \quad P[A \cup B] = .59, \\ P[B \cup C] = .56, \quad P[C \cup A] = .57, \quad P[A \cup B \cup C] = .61$$

- (a) Find the probability that none of the events A, B, C occur. [4]
 (b) Find the probability that exactly one of the events A, B, C occurs. [8]
 (c) Find the exact value of $P[B|C]$ [8]
 (d) Convert your answer to part (c) into odds. [3]

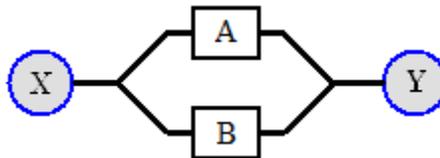
3. A board of directors must elect from among its twelve (12) members a chair, a vice chair, a secretary and a treasurer. No one director may be elected to more than one of these four offices.

- (a) In how many distinct ways may these four officers be chosen? [6]
 (b) These four officers are the only members of the executive committee. [6]
 In how many distinct ways may the membership of the executive committee be chosen?

Show your working and express your final answers as single numbers.

4. *BONUS QUESTION* [+5]

Pumping stations A, B are connected in parallel to transport water from point X to point Y, as illustrated.



Each station works 80% of the time when the other station is working, but only 30% of the time when the other station has failed.

Find the probability that this system will transport water from point X to point Y.

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