AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
Department of PHYSICS & ENG. MATH.
1st Level Students

Midterm, 1st Semester, Fall 2020	**Course Code: *PHM 111s***	***Time allowed: 1 Hr.***

Probability and Statistics_PHM111s (Model A)

The Exam Consists of **3** Questions in **1** Page. ***Maximum Marks: 20 Marks*** **1 / 4**

تعليمات هامة

- حيازة التيلفون المحمول مفتوحا داخل لجنة الأمتحان يعتبر حالة غش وإذا كان من الضرورى الدخول بالمحمول فيوضع مغلق فى الحقائب.
- لا يسمح بدخول سماعة الأذن أو البلوتوث.
- لايسمح بدخول أي كتب أو ملازم أو أوراق داخل اللجنة والمخالفة تعتبر حالة غش. يستثنى من ذلك الامتحانات ذات الكتاب المفتوح Open Book

Name: ***ID:***

Question (1): *[8 Marks]*

The data of the following Table specify the life of 40 similar car batteries recorded to the nearest tenth of a year. For the given data:

Class	Class Limit	Frequency
1	1.6 - 2.0	2
2	2.1 - 2.5	1
3	2.6 - 3.0	4
4	3.1 - 3.5	15
5	3.6 - 4.0	10
6	4.1 - 4.5	5
7	4.6 - 5	3

a) What is the class width?
b) Compute the class boundaries and midpoints.
c) Construct the histogram of the data in the given Table.
d) Calculate the sample mean, median, and mode.
e) Is the histogram symmetric, positively skewed, or negatively skewed?
Justify your answer.

Question (2): *[9 Marks]*

The following data are the joint temperatures of the O-rings (°F) for each test firing or actual launch of a space shuttle rocket motor:

53, 84, 28, 78, 35, 111, 40, 166, 108, 60, 123, 87, 84, 74, 80, 62, 190

a) Compute the sample mean and sample standard deviation.
b) Compute the interquartile range.
c) Construct a boxplot of the given data.
d) Use the interquartile range to find possible outlier(s).
e) Set aside the outlier(s) and recompute the quantities in part (a). Comment on your findings.

Question (3): *[3 Marks]*

The following data represent the values in billions of dollars of the damage of 10 hurricanes.

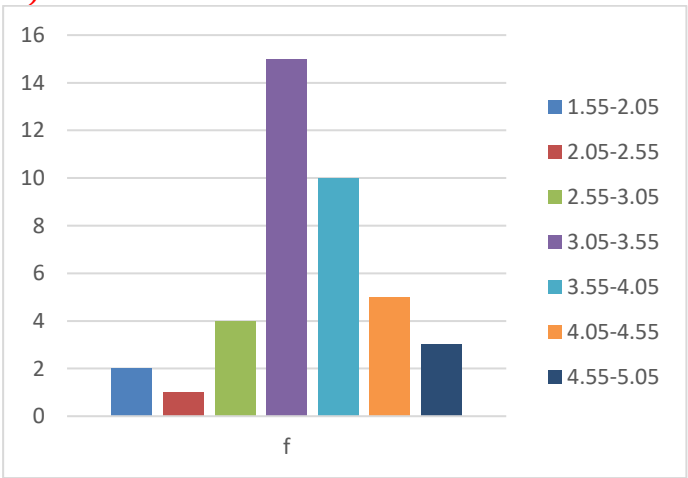
1.1, 1.7, 1.9, 2.1, 2.2, 2.5, 3.3, 6.2, 6.8, 20.3

a) Find the percentile rank for the value 3.3 billion dollars.
b) What value corresponds to the 58^{th} percentile?

Question (1)

Class	Class Limit	Class Limit	Class B L	Class B H	Midpoint	f	CF	f * X	f * X2
1	1.6	2	1.55	2.05	1.8	2	2	3.6	6.48
2	2.1	2.5	2.05	2.55	2.3	1	3	2.3	5.29
3	2.6	3	2.55	3.05	2.8	4	7	11.2	31.36
4	3.1	3.5	3.05	3.55	3.3	15	22	49.5	163.35
5	3.6	4	3.55	4.05	3.8	10	32	38	144.4
6	4.1	4.5	4.05	4.55	4.3	5	37	21.5	92.45
7	4.6	5	4.55	5.05	4.8	3	40	14.4	69.12
							Sum	140.5	512.45

a) Class Width = 0.5 (1 Mark)
b) In table (2 Marks)
c) Histogram (1 Mark)

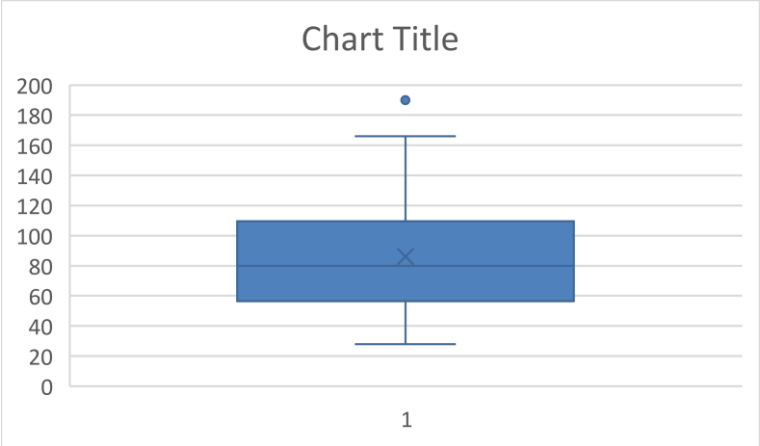


d) Mean = 3.51, Median = 3.48, Mode = 3.39 (3 Marks)
e) Positively skewed. Justification: Median < Mean (1 Mark)

Question (2)

Data	Sorted Data
53	28
84	35
28	40
78	53
35	60
111	62
40	74
166	78
108	80
60	84
123	84
87	87
84	108
74	111
80	123
62	166
190	190

a) Sample mean = 86.06, Sample standard deviation = 43.57. (2 Marks)
b) Q1 = 56.5, Median (Q2) = 80, Q3 = 109.5. (2 Marks)
Interquartile range = Q3 – Q1 = 53.
c) A boxplot of the given data. (1 Mark)



d) Q1-1.5 * IQR = -23, Q3+1.5 * IQR=189 (2 Marks)
Outlier is 190

f) Sample mean without outlier = 79.56.
Sample standard deviation without outlier = 35.49 (1 Mark for Mean & Std)
The sample standard deviation is reduced after removing the outlier showing a smaller variation in data as expected. (1 Mark)

Question (3)

Data: 1.1, 1.7, 1.9, 2.1, 2.2, 2.5, 3.3, 6.2, 6.8, 20.3

a) P = (Number of values below 3.3 + 0.5) / Total number of values = 65th. (1 Mark)
b) C = n*p / 100 = 58 * 10 / 100 = 5.8 ➔ C = 6 ➔ Value = 2.5 billion dollars (1 Mark)
(1 Mark if both formulas are correct)

END of Exam, Good Luck

Course Examination Committee			*Exam. Date: 3rd Dec. 2020*	
Prof. Hamdy Ahmed	*Dr. Ahmed Ibrahim*	*Dr. Rabab Moustafa*	*Dr. Noha Medhat*	*Dr. Ramy Farouk*