

- [3]
1. The data given below are seven temperature readings reported in degrees Celsius.

15 , 23 , -18 , 19 , 26 , -5 , 12

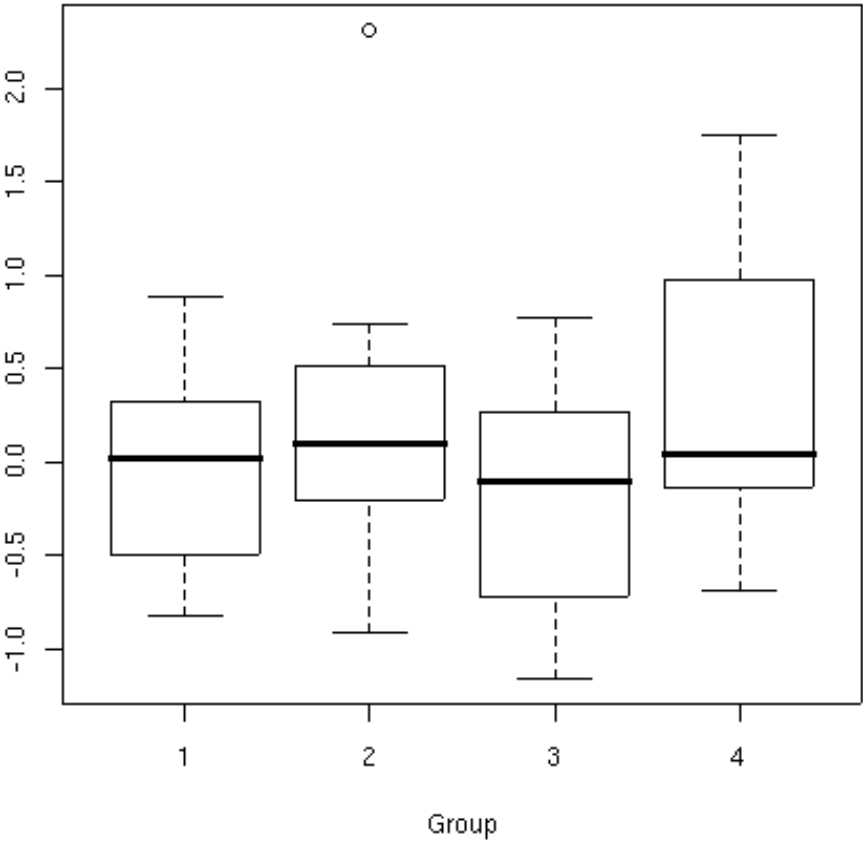
The temperatures are converted into the Kelvin scale by adding 273.16. Determine which of the following statements are true.

- i. The temperatures reported in Kelvin will have a higher variance than the temperatures in degrees Celsius.

ii. The standard deviation of the temperatures in Kelvin will be higher than the standard deviation of the temperatures in degrees Celsius.

iii. The mean of the temperatures in Kelvin will be less than the mean of the temperatures in degrees Celsius.

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2. Four groups of investors reported the percent increase or decrease in the value of their investments. The side-by-side boxplots shown below display the percentage increase (positive values) or decrease (negative values) for investors in each group.



Determine which of the following statements are true.

- i. Group 4 has the largest range of values.

ii. Group 4 has approximately half of its observations below zero.

iii. Group 3 reported the lowest value.

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3. The sample data given below are the weights of snowboarders and the lengths of their snowboards.

weight (kg)	51	57	76	88
length (cm)	142	140	162	170

The correlation coefficient for these data is $r = 0.9777$. If the lengths of the snowboards are reported in metres instead of centimetres, what will the correlation coefficient between the weights (in kg) and lengths (in metres) be now?

Note that the equation for the correlation coefficient is:

$$r = \frac{\sum_{i=1}^n [(x_i - \bar{x})(y_i - \bar{y})]}{\sqrt{[\sum_{i=1}^n (x_i - \bar{x})^2] \cdot [\sum_{i=1}^n (y_i - \bar{y})^2]}}$$

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4. The following table is a result of classifying 1000 randomly-selected car accidents by the type of injury the driver sustained and the type of restraint used by the driver.

Suppose a car accident is chosen at random from the 1000 accidents studied. What is the probability that the driver of the chosen car accident had a major injury or wore a seat belt or both?

Restraint	Injury				Totals
	None	Minor	Major	Death	
Seat Belt	75	160	100	15	
Harness	60	115	65	10	
None	65	175	135	25	
Totals					1000

- [3] **5.** Given events A and B with probabilities $P(A) = 0.5$, $P(B) = 0.3$ and $P(A \cap B) = 0.1$, calculate the probability $P(A \cup \bar{B})$ (which is equivalent to, using another notation, $P(A \cup B')$).



- [3] **6.** Over the past years, 90% of Stat 260 students study for the first midterm. Of those who study, 30% get an A grade on the first midterm, whereas 5% of those who do not study get an A grade. If you learn that a randomly selected student has an A grade on the first midterm, what is the probability that he/she studied?



Questions 7, 8 and 9 refer to the following setup:

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7. The probability mass function (pmf) for X =the number of major defects on a randomly selected appliance is:

x	0	1	2	3	4
$p(x) = P(X = x)$.08	.15	.45	.27	.05

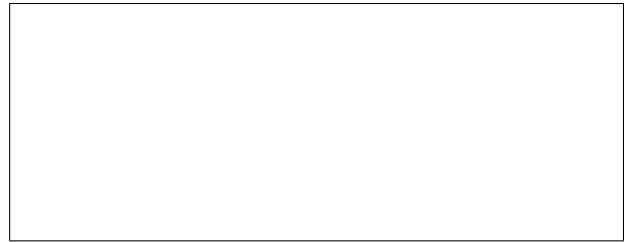
What is the probability that the appliance has at least 3 defects?

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8. Compute the expected value of X , $E(X) = \mu$.

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9. Compute the variance of X , $Var(X) = \sigma^2$.

[3] **10.** Determine which of the following statements are true.

- i. Events A and B are independent if $P(A \cap B) = P(A)P(B)$.
- ii. Events A and B are mutually exclusive if $P(A \cap B) = P(A)P(B)$.
- iii. Events A and B are independent if $P(A|B) = P(A)P(B)$.



[4] **11.** LONG ANSWER QUESTION: Harold, Kumar and Neil are caught breaking into a waffle factory. The three suspects are interviewed separately and are asked to confess who planned the robbery. Suppose each person has a 40% chance of confessing. Assuming the suspects respond **independently** of one another, what is the probability that **exactly** one person confesses?

- [4] **12. BONUS LONG ANSWER QUESTION:** Two pumps connected in parallel fail independently of one another on any given day. The probability that ONLY the older pump will fail is .10 and the probability that ONLY the new pump will fail is .05. What is the probability that both of the pumps will fail on any given day?