KFUPM	**Term 042**	**Date: 18/4/2005**
Mathematical Sciences	**STAT 211**	**Duration: 15 minutes**
	Quiz# 4	

Name: **ID#:** **Serial#:** **Section#:**

Show your work in detail and write neatly and eligibly

1. A manufacturing company makes three types of products. Each time it makes a product, the item can be either good or defective and it can be either customized or standard. The events consisting of customized and defective would be considered mutually exclusive since they apply to different attributes of the product. **(True, False)** **(1 point)**

2. A New Jersey company relies on a steady supply of power to keep its manufacturing going. Recently at a planning meeting, the general manager stated that the chance of a rolling blackout affecting production is 0.15. The controller stated that the chance of a rolling blackout is 0.30. The reason that the two probabilities are different is that these assessments were based on classical probability techniques. **(True, False)** **1 point)**

3. A used car lot has 15 cars. Five of these cars were manufactured in the U.S. and the remainders were made in other countries. If three cars are purchased, the probability that all three will be U. S. made cars is approximately .022. **(True, False)** **(1 point)**

Answer:

Let U the car manufactured in the U.S, and R the car made in other countries

$$P(\text{the three cars made in } US) = P(U \& U \& U) = \frac{5}{15}\frac{4}{14}\frac{3}{13} = \frac{60}{2730} = 0.0219 \approx 0.022$$

4. The following probability distribution was subjectively assessed for the number of sales a salesperson would make if they made five sales calls in one day.

Sales	Probability
0	0.10
1	0.15
2	0.20
3	0.30
4	0.20
5	0.05

When the salesperson makes a sale, there are three possible sales levels: large, medium, and small. The probability of a large sale is 0.20 and the chance of a medium sale is 0.60. If a salesperson makes two sales, the probability that at least one is large is 0.36. **(True, False)** **(1 point)**

Answer:

Let E_1: large sale, E_2: medium sale andE_3: small sale, and $P(E_1) = 0.2,\ P(E_2) = 0.6\ \ P(E_3) = 0.2$

$$P(\text{at least one is large}) = P(E_1E_1) + P(E_1E_2) + P(E_2E_1) + P(E_1E_3) + P(E_3E_1)$$

$$= (0.2)(0.2) + (0.2)(0.6) + (0.6)(0.2) + (0.2)(0.2) + (0.2)(0.2) = 3(0.2)^2 + 0.24 = 0.36$$

5. A study was recently done in which 500 people were asked to indicate their preferences for one of three products. The following table shows the breakdown of the responses by gender of the respondents.

	Product Preference		
Gender	A	B	C
Male	80	20	10
Female	200	70	120

Based on these data, find the probability that a person in the population will prefer product A.

Answer: **(2 point)**

$$P(a\ person\ will\ \ prefer\ \ product\ A) = P(Male\ and\ \ prefer\ A) + P(Fimale\ and\ \ prefer\ A)$$

$$= \frac{80}{500} + \frac{200}{500} = \frac{280}{500} = 0.56$$

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6. The managers of a local golf course have recently conducted a study of the types of golf balls used by golfers based on handicap. A joint frequency table for the 100 golfers covered in the survey is show below:

	Type of Golf Ball			
Handicap	Strata	Titleist	Nike	Other
< 2	5	8	3	2
2 < 10	8	7	9	10
≥ 10	7	8	10	23

If a player comes to the course using a Nike golf ball, find the probability that he or she has a handicap of at least 10.

Answer:

$$P(\geq 10 | NIKE) = \frac{P(\geq 10 \cap NIKE)}{P(NIKE)} = \frac{10/100}{22/100} = \frac{10}{22} = 0.454545$$ **(2 point)**

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7. The following probability distribution has been assessed for the number of accidents that occur in a midwestern city each day:

Accidents (x_i)	Probability $P(x_i)$	$(x_i)P(x_i)$	$(x_i)^2$	$(x_i)^2P(x_i)$
0	0.25	0	0	0
1	0.20	0.20	1	0.20
2	0.30	0.60	4	1.20
3	0.15	0.45	9	1.35
4	0.10	0.40	16	1.60
SUM		1.65		4.35

Based on this probability distribution, find the standard deviation in the number of accidents per day.

Answer: **(2 point)**

$$E(X) = \sum x_i P(x_i) = 1.65,$$

$$Std = \sqrt{\sum x_i^2 P(x_i) - E(X)^2} = \sqrt{4.35 - (1.65)^2} = \sqrt{1.6275} = 1.2757$$

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2. A New Jersey company relies on a steady supply of power to keep its manufacturing going. Recently at a planning meeting, the general manager stated that the chance of a rolling blackout affecting production is 0.15. The controller stated that the chance of a rolling blackout is 0.30. The reason that the two probabilities are different is that these assessments were based on classical probability techniques. **(True, False)** **(1 point)**

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$$P(\textit{the three cars made in US}) = P(U \,\&U \,\&U) = \frac{5}{15}\frac{4}{14}\frac{3}{13} = \frac{60}{2730} = 0.0219 \approx 0.022$$

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Answer:

Let E_1: large sale, E_2: medium sale andE_3: small sale, and $P(E_1) = 0.2,\ P(E_2) = 0.6\ \ P(E_3) = 0.2$

$$P(\text{at least one is large}) = P(E_1E_1) + P(E_1E_2) + P(E_2E_1) + P(E_1E_3) + P(E_3E_1)$$

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5. A study was recently done in which 500 people were asked to indicate their preferences for one of three products. The following table shows the breakdown of the responses by gender of the respondents.

	Product Preference		
Gender	A	B	C
Male	80	20	10
Female	200	70	120

Based on these data, find the probability that a person in the population will prefer product C.

Answer: **(2 point)**

$$P(a\ person\ will\ \ prefer\ \ product\,C) = P(Male\ \ and\ \ prefer\,C) + P(Fimale\ \ and\ \ prefer\,C)$$

$$= \frac{10}{500} + \frac{120}{500} = \frac{130}{500} = 0.26$$

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6. The Baker Oil and Gas Company has four retail locations code named A, B, C, and D. The following table illustrates the percentage of total company sales at each store and also the percentage of customers at that store who make purchases with debit cards:

Store	Proportion of Total Sales	Proportion of Customers Using Debit
A	0.18	0.32
B	0.30	0.19
C	0.41	0.18
D	0.11	0.40

Based on this information, find the probability that a customer who used a debit card shopped at store C.

Answer: **(2 point)**

$$P(C\,|used\ \ debit\ \ card) = \frac{P(C \cap used\ \ debit\ \ card)}{P(used\ \ debit\ \ card)}$$

$$= \frac{0.41 \times 0.18}{0.18 \times 0.32 + 0.3 \times 0.19 + 0.41 \times 0.18 + 0.11 \times 0.40} = \frac{0.0738}{0.2324} = 0.317556$$

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7. The Ski Patrol at Criner Mountain Ski Resort has determined the following probability distribution for the number of skiers that are injured each weekend:

	Injured Skiers(x_i)	Probability$P(x_i)$	x_iPx_i	x_i^2	$x_i^2P(x_i)$
	0	0.15	0	0	0
	1	0.05	0.05	1	0.05
	2	0.40	0.80	4	1.60
	3	0.10	0.30	9	0.90
	4	0.30	1.20	16	4.80
SUM			2.35		7.35

Based on this information, find the standard deviation for the number of injuries per weekend.

$$E(X) = \sum x_i P(x_i) = 2.35$$ **(2 point)**

$$Std = \sqrt{\sum x_i^2 P(x_i) - E(X)^2} = \sqrt{7.35 - (2.35)^2} = \sqrt{1.8275} = 1.351851$$