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AP Statistics – Chapter 14 *Name*_____

1. Five multiple choice questions, each with four possible answers, appear on your history exam. What is the probability that if you just guess, you
   a. get none of the questions correct? $1\left(\frac{3}{4}\right)^5 = \frac{243}{1024} \approx .2373$
   b. get all of the questions correct? $\left(\frac{1}{4}\right)^5 = \frac{1}{1024} = .00098$
   c. get at least one of the questions wrong? $1 - \text{none wrong} = \frac{1023}{1024} = .999$
   d. get your first incorrect answer on the fourth question? $\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)\left(\frac{3}{4}\right) = \frac{3}{256} = .0117$

2. The Masterfoods company manufactures bags of Peanut Butter M&M's. They report that they make 10% each brown and red candies, and 20% each yellow, blue, and orange candies. The rest of the candies are green.

$\frac{1}{10}$ Brown
$\frac{1}{10}$ Red
$\frac{2}{10}$ Yellow
$\frac{2}{10}$ Blue
$\frac{2}{10}$ orang
$\frac{2}{10}$ green

   a. If you pick a Peanut Butter M&M at random, what is the probability that
      i. it is green? $\frac{2}{10} = .2$
      ii. it is a primary color (red, yellow, or blue)? $\frac{5}{10} = .5$
      iii. it is not orange? $1 - \frac{2}{10} = .8$
   b. If you pick four M&M's in a row, what is the probability that
      i. they are all blue? $\left(\frac{2}{10}\right)^4 = \frac{16}{10000} = .0016$
      ii. none are green? $\left(\frac{8}{10}\right)^4 = .4096$
      iii. at least one is red? $1 - \text{no red} = 1 - \left(\frac{9}{10}\right)^4 = .3439$
      iv. the fourth one is the first one that is brown? $\left(\frac{9}{10}\right)\left(\frac{9}{10}\right)\left(\frac{9}{10}\right)\left(\frac{1}{10}\right) = .0729$
   c. After picking 10 M&M's in a row, you still have not picked a red one. A friend says that you should have a better chance of getting a red candy on your next pick since you have yet to see one. Comment on your friend's statement.

If the next one is independent of the previous then the Friend is incorrect. . . . If by picking 10 None Red it changes the Prob of red then it would be correct

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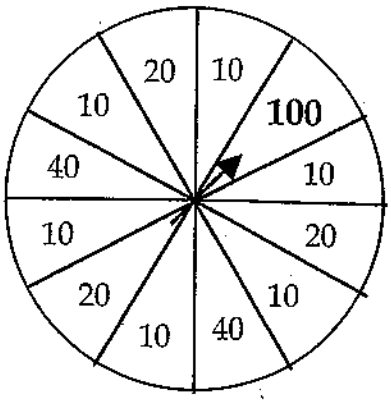
[redacted] – *Chapter 14* *Name*_____

A sporting goods store announces a "Wheel of Savings" sale. Customers select the merchandise they want to purchase, then at the cash register they spin a wheel to determine the size of the discount they will receive. The wheel is divided into 12 regions, like a clock. Six of those regions are red, and award a 10% discount. The three white regions award a 20% discount and two blue regions a 40% discount. The remaining region is gold, and a customer whose lucky spin lands there gets a 100% discount - the merchandise is free! Show your work.



1. What is the probability that a customer gets at least a 40% discount? 40 or 100

$\frac{3}{12} + \frac{1}{12} = \frac{3}{12} = \frac{1}{4}$ (25%)

2. What is the probability that two customers in a row get only 10% discounts?

$\left(\frac{6}{12}\right)\left(\frac{6}{12}\right) = \frac{36}{144} =$ (25%)

3. What is the probability that three consecutive customers all get 20% discounts?

$\left(\frac{3}{12}\right)^3 = \frac{27}{1728} = .015625$

4. What is the probability that none of the first four customers gets a discount over 20%? 10 or 20

10% or 20% Discount is $\frac{9}{12}$ $\left(\frac{9}{12}\right)^4 = .3164$

5. What is the probability that the first gold winner (100%) is the fifth customer in line?

$\left(\frac{11}{12}\right)\left(\frac{11}{12}\right)\left(\frac{11}{12}\right)\left(\frac{11}{12}\right)\left(\frac{1}{12}\right) = .059$

6. What is the probability that there is at least one gold winner among the first six customers?

1 – there's none $1 - \left(\frac{11}{12}\right)^{6}$ one or two or three or four $= 1 - .5932921945 = .4067$

7. As you wait your turn in line there are three gold winners in a row. A lively discussion ensues between the next two customers. One thinks that streak about kills her chances of winning free merchandise, as the wheel won't come up gold again for a very long time. The other says that the wheel is clearly on a hot streak, so they are lucky to be next in line. Comment on their opinions.

Each spin is independent of the previous so the law of large numbers apply and there is no "hot-streak" so either way the probability of getting gold is $\frac{1}{12}$.