MU ALPHA THETA
NATIONAL CONVENTION
SAN DIEGO 2013

Hustle
Test #841
Probability & Statistics

MU ALPHA THETA
NATIONAL CONVENTION
SAN DIEGO 2013

Hustle
Test #841
Probability & Statistics

MU ALPHA THETA
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Hustle
Test #841
Probability & Statistics

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Hustle
Test #841
Probability & Statistics

#1 Probability and Statistics – Hustle
MAΘ National Convention 2013

Find the variance of the following numbers obtained from a *sample*: 3, 5, 6, 12, 14

Answer : ______________________

Round 1 2 3 4 5

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#2 Probability and Statistics – Hustle
MAΘ National Convention 2013

Suppose students are taking a 25 question multiple choice test. Each question has answer choices a, b, c, or d, only one of which is correct. If the students are completely unprepared for the test and their answers are simply guesses, find the standard deviation for the number of correct answers.

Answer : ______________________

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#3 Probability and Statistics – Hustle
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A teacher gives a quiz and then a test on the same material. The mean score on the quiz is 15 and the standard deviation is 3. The mean score on the test is 79 and the standard deviation is 11. Which score is relatively better: a 14 on the quiz, or a 75 on the test?

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#4 Probability and Statistics – Hustle
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Suppose that you buy a bag of M&M's. You count the M&M's and discover that you have 10 red, 14 orange, 7 yellow, 10 brown, 11 blue, and 6 green M&M's. After counting the M&M's, you put them back in the bag and shake the bag to mix the colors. What is the probability that you select a red M&M or a blue M&M?

Answer : ______________________

Round 1 2 3 4 5

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#5 Probability and Statistics – Hustle
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You decide to roll a standard fair, six-sided die until you observe a 5. Find the probability that it will take you more than 4 rolls to observe a 5.

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#6 Probability and Statistics – Hustle
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A couple plans to have 4 children. Let *X* be the number of boys the couple has. What is the probability that $X = 2$? Assume that boys and girls are equally likely and that the gender of any child is independent. Express your answer as a common fraction.

Answer : _____

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#7 Probability and Statistics – Hustle
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The distribution of salaries at a company is strongly skewed to the right. A recruiter wants prospective employees to believe that they can earn a high salary at this company. Among the mean, median, or mode, which of these three measures of center should this recruiter report to these prospective employees?

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A couple plans to have 3 children. Find the probability of getting at least 1 girl. Assume that boys and girls are equally likely and that the gender of any child is independent. Express your answer as a common fraction.

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#9 Probability and Statistics – Hustle
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Assuming that the heights of college women are normally distributed with mean 65 inches and standard deviation 2.5 inches. Estimate what percentage of women are between 62.5 and 70 inches.

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#10 Probability and Statistics – Hustle
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#12 Probability and Statistics – Hustle
MAΘ National Convention 2013

You want to become a CEO of a major company at a very young age. You take a sample of 7 CEOs and ask them how old they were when they became CEOs. You obtain the following ages: 46, 50, 70, 32, 43, 51, and 55. You want to be so young when you become CEO that your age will be considered an outlier. You intend to use the $1.5 \bullet IQR$ method for identifying an outlier. You find that the lower quartile is 43 and the upper quartile is 55. Calculate the lower cutoff for an outlier.

Answer : ______________________

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The following table shows the distribution of grades (A = 4, B = 3, C = 2, D = 1, F = 0) in a large Physics class at a major university:

Grade:	0	1	2	3	4
Probability:	0.05	0.15	0.40	0.35	0.05

Find the mean grade in this course. Express your answer as a decimal.

Answer : _____

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#14 Probability and Statistics – Hustle
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Voter registration records show that 64% of all voters in New York City are registered as Democrats. A pollster uses a computer to randomly select 200 New York City residents. Of the registered voters contacted, 70% are registered Democrats. What is the standard deviation of the sample proportion of registered Democrats in the samples of size 200 from New York City?

Answer : ______________________

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#15 Probability and Statistics – Hustle
MAΘ National Convention 2013

Suppose we have explanatory and response variables and we know that $\bar{x}=3.7, \bar{y}=119,$ $s_x=5, s_y=20,$ and the correlation is $r=0.95.$
Write the equation for the least squares regression line. Express your answer in slope-intercept form.

Answer : _____

Round 1 2 3 4 5

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#16 Probability and Statistics – Hustle
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The weight reported on a Hershey Bar is 43g. The company wants to report the mean weight of their candy bars accurate to within ± 3g with 95% confidence. Statistical tables report $z^* = 1.96$. If the standard deviation of the bars is 6, how large a sample of candy bars must be measured to comply with this request?

Answer : _____

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#17 Probability and Statistics – Hustle
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The homeowners association in your neighborhood reports that the mean price for a home in your neighborhood is $325,000. This doesn't seem accurate to you; you suspect that the houses are worth more than $325,000. You randomly select 30 homes in your neighborhood and take the average of their assessed value. According to your calculations, the mean price for a home in your neighborhood is $399,000. Identify the null and alternative hypotheses.

Answer : ______________________

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#18 Probability and Statistics – Hustle
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In the 2012 Olympics Women's Gymnastics competition, the United States won gold, Russia won silver, and Romania won bronze. Suppose that 55% of adults polled liked the U.S. team, 25% of adults liked the Russian team, and 45% of adults liked the Romanian team. Also suppose that 15% of adults liked both the U.S. and Russian teams, 5% of adults liked all three teams, 25% of adults liked both the U.S. and Romanian teams, and 5% of adults liked only the Russian team. What percent of adults liked none of these three teams?

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#19 Probability and Statistics – Hustle
MAΘ National Convention 2013

Rebecca decides it would be fun to try skydiving. On the day of her first jump, Rebecca's instructor gives her a parachute and tells her that the parachute is safe. Just before her turn to jump, Rebecca rejects the hypothesis that the parachute is safe and decides not to jump. If the parachute is, in fact, safe, what type of error has Rebecca made?

Answer : ______________________

Round 1 2 3 4 5

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#20 Probability and Statistics – Hustle
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Twenty-seven students are competing in a mathematics tournament. These students take a written exam. After the exam, a 4-member team is to be formed from the 27 competitors. If the selections are random, what is the probability of getting a team that consists of the 4 students who earned the highest scores on the written exam?

Answer : ______________________

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#20 Probability and Statistics – Hustle
MAΘ National Convention 2013

Twenty-seven students are competing in a mathematics tournament. These students take a written exam. After the exam, a 4-member team is to be formed from the 27 competitors. If the selections are random, what is the probability of getting a team that consists of the 4 students who earned the highest scores on the written exam?

Answer : ______________________

Round 1 2 3 4 5

#21 Probability and Statistics – Hustle
MAΘ National Convention 2013

The manufacturer claims that the distribution of the colors of Skittles are as follows:

Color	Purple	Red	Green	Yellow	Orange
%	30	20	20	20	10

You want to find out if these percentages are correct. Your bag of Skittles contains 100 Skittles. Your observed counts are as follows:

Color	Purple	Red	Green	Yellow	Orange
#	25	18	22	16	19

You perform a goodness of fit test. Calculate X^2.

Answer : _____

Round 1 2 3 4 5

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#22 Probability and Statistics – Hustle
MAΘ National Convention 2013

Use the following table to calculate the degrees of freedom for the chi-square test for homogeneity of populations.

A	12	27	19
B	70	63	20
C	56	45	81
D	17	9	32
E	33	25	56
F	26	16	47

Answer : _____

Round 1 2 3 4 5

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MAΘ National Convention 2013

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#23 Probability and Statistics – Hustle
MAΘ National Convention 2013

You toss a coin 2000 times. You get 1011 heads. You decide to use a significance test to determine whether your coin is balanced. You test the hypotheses:

$$H_0: \ p = 0.5$$
$$H_a: \ p \neq 0.5$$

Calculate the z test statistic.

Answer : ______________________

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Answer : ______________________

Round 1 2 3 4 5

#24 Probability and Statistics – Hustle
MAΘ National Convention 2013

John and Sarah are competing in their country club's charity golf tournament. Their scores vary as they play the course repeatedly. John's score *J* has the $N(104,5)$ and Sarah's score *S* has the $N(99,10)$. If they play independently, what is the standard deviation of the difference in their scores?

Answer : ______________________

Round 1 2 3 4 5

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MAΘ National Convention 2013

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Round 1 2 3 4 5

#25 Probability and Statistics – Hustle
MAΘ National Convention 2013

If $n = 64$, $\bar{x} = 10$, and $s = 3$, construct a 99% confidence interval ($z^* = 2.656$). Express your answer in the form $a \pm b$, where a is a positive integer and $0 < b < 1$.

Answer : _____

Round 1 2 3 4 5

#25 Probability and Statistics – Hustle
MAΘ National Convention 2013

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