

Probability and Statistics: math test, Grade 11 – download the PDF

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Counting

/ 3 pts

A club has 9 members. (a) In how many ways can a president, a vice president and a treasurer be chosen? (b) In how many ways can a 3-member planning team be chosen? (c) How many different arrangements of the letters of BALLOON are there?

2 Marbles

/ 4 pts

A box holds 5 red, 3 blue and 2 yellow marbles. Two marbles are drawn without replacement. (a) Find the probability that both are red. (b) Find the probability that both are the same color. (c) If the first marble were replaced before the second draw, what would be the probability of two red marbles?

3 Conditional probability

/ 3 pts

Of 150 customers, 80 shopped online and 70 in the store. Of the online customers, 36 made a purchase; of the store customers, 42 did. (a) Find $P(\text{purchase} \mid \text{online})$. (b) Find $P(\text{online} \mid \text{purchase})$. (c) Is making a purchase independent of shopping online? Justify.

4

Binomial model

/ 3 pts

A machine makes good parts 90% of the time, independently. Six parts are made. (a) Find the probability that exactly 5 are good. (b) Find the probability that at least 5 are good. (c) Find the mean and standard deviation of the number of good parts.

5

Watermelons

/ 4 pts

The weights of watermelons are normally distributed with mean 12 lb and standard deviation 1.5 lb (about 5.4 kg and 0.7 kg). (a) Find the z-scores of 15 lb and of 10.5 lb. (b) What percent weigh between 9 lb and 15 lb? (c) What percent weigh more than 13.5 lb?

6

Poll and bias

/ 3 pts

A pollster surveys 900 people chosen at random, and 54% favor a proposal. (a) Compute the 95% margin of error. (b) Can the pollster claim that a majority of the population favors the proposal? Explain. (c) Another poll was taken only at a gym entrance. Explain why it would be less reliable.

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