



“FRAPPY” {Free Response AP Problem...Yay!}

The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 25 minutes. You will be graded based on the AP rubric and will earn a score of 0-4. After grading, keep this problem in your binder for your AP Exam preparation.

The manager of a cultured pearl farm has received a special order for two pearls between 7 millimeters and 9 millimeters in diameter. From past experience, the manager knows that the pearls found in his oyster bed have diameters that are normally distributed with a mean of 8 millimeters and a standard deviation of 2 millimeters. Assume that every oyster contains one pearl.

The manager wants to know how many oysters he should expect to open to find two pearls of the appropriate size for this special order. Complete the following parts to design a simulation to answer the manager's question.

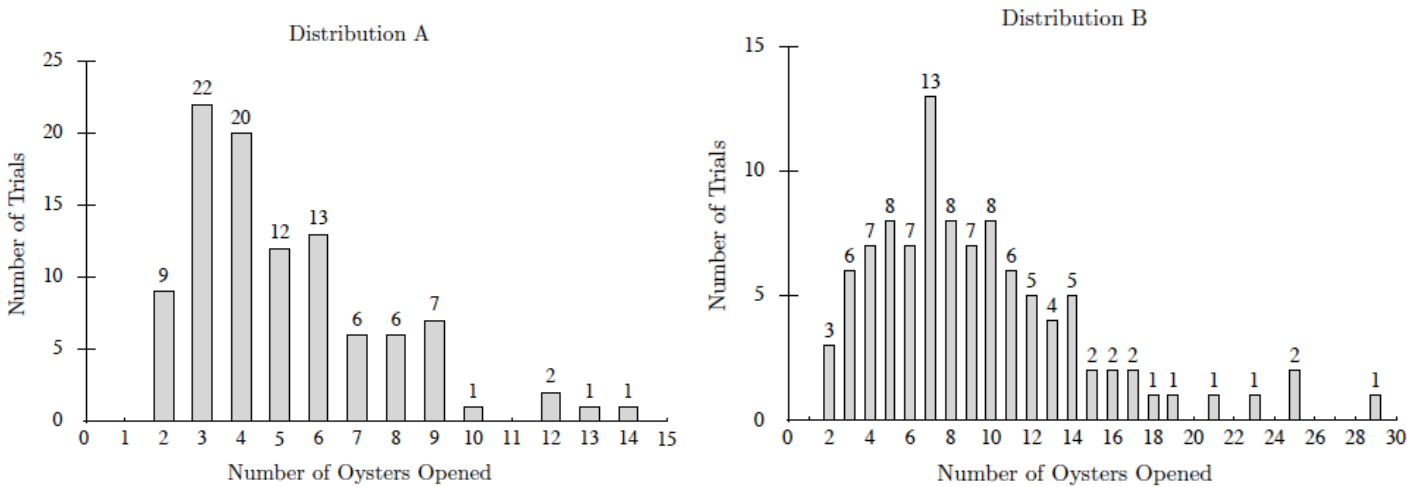
(a) Determine the probability of finding a pearl of the appropriate size in an oyster selected at random. (Express this probability as a number between 0 and 1. Round this probability to the nearest tenth.)

(b) Describe how you would use a table of random digits to carry out a simulation to determine the number of oysters needed to find two pearls of the appropriate size. Include a description of what each of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 will represent in your simulation.

(c) Perform your simulation 3 times. (That is, run 3 trials of your simulation.) Start at the upper left most digit in the first row of the table and move across. Make your procedure clear so that someone can follow what you did. You must do this by marking directly on or above the table.

48747	76595	32588	38392	84422	80016	37890
71950	22494	00369	51269	87073	73694	97751
17857	52352	21392	22930	43776	10503	58249
80993	52010	88856	23882	73613	57648	47051
63016	73572	22684	02409	37565	52457	01257
40615	63910	09596	10241	03413	77576	74872
57431	29251	77848	98037	81230	38561	69580
06181	97842	48327	37976	81333	10264	77769

(d) The results of two 100-trial simulations, one searching for two pearls between 7 millimeters and 9 millimeters and the other searching for two pearls between 4 millimeters and 6.5 millimeters are shown below.



Identify which distribution, A or B, represents the search for two 7 millimeter to 9 millimeter pearls. Explain your reasoning.

(e) Use the appropriate distribution in part (d) to compute an estimate of the expected number of oysters opened to find two pearls between 7 millimeters and 9 millimeters in diameter.