



“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 Blue Shell Shuttle Bus Company has recently acquired the rights to run a shuttle between Lonestar’s hotels and its airport, which is several miles away. For the new route, the company has a choice of running coaches that can carry up to 60 people or smaller vans that can carry up to 12 people. The company has a policy that each of its routes is served only by one type of shuttle vehicle. In addition, due to the allocation of their vehicles to other routes, no change in their decision can be considered for at least a year. The annual return (profit or loss) depends on whether the demand for the service is strong or weak. Research suggests that the following returns can be expected.

Annual Return (\$10,000)		
Vehicle Decision	Demand	
	Strong	Weak
Coach	84	-27
Van	61	45

For instance, if a coach is used and demand is strong, the expected annual return is \$840,000. The expected return to the company can be calculated based on the probability of a strong demand. Let p represent the probability of a strong demand; then $(1 - p)$ represents the probability of a weak demand.

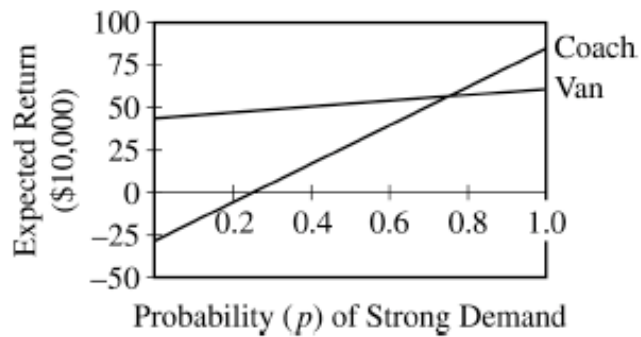
An equation that can be used to compute the expected return from the use of coaches based on the value of p is

$$84p + (-27)(1 - p) = 111p - 27.$$

An equation that can be used to compute the expected return from the use of vans based on the value of p is

$$61p + 45(1 - p) = 16p + 45.$$

These two functions are shown on the graph on the next page.



Scoring:

(a) The value of p for which the expected annual return for the vans is equal to the expected annual return for the coaches is 0.76. If the probability of strong demand is less than this value, which decision, running coaches or running vans, will provide the greater expected return? Justify your answer.

E P I

(b) There are several thousand markets similar to Lonestar's market across the country. A random sample of 100 of these markets reveals that the demand for an airport shuttle is strong in 65 of them and the demand in the remaining 35 is weak. Using the results of this sample, construct and interpret a 95 percent confidence interval for the proportion of similar markets that will experience a strong demand.

E P I

(c) The president of Blue Shell has decided to use vans for the new route. Using the results of the analysis in parts (a) and (b), write a few sentences to justify this decision.

E P I

(d) After looking at the interval in part (b) and considering possible annual returns, the vice president of Blue Shell believes that the president has made an incorrect decision in choosing to use vans. Explain how this conflicting position could be supported.

E P I

Total: __/4