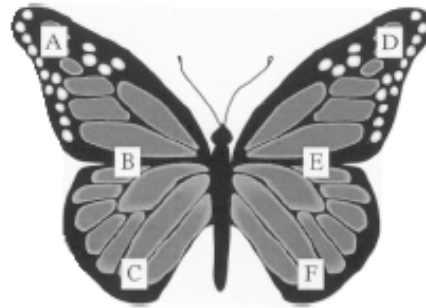




“FRAPPY” {Free Response AP Problem...Yay!}

The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 15 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.

Researchers often mark wildlife in order to identify particular individuals across time or space. A study of butterfly migration is designed to determine which location on the butterflies' wings is best for marking. The six possible locations are those shown as A through F in the figure below. The butterfly in the figure is a monarch (*Danaus plexippus*).



Because marks in certain locations may be more likely to attract predators or cause problems than marks in other locations, the goal is to determine whether the six marking locations result in equivalent chances of successful migration. To test this, researchers plan to mark 3,600 butterflies and release them, then count how many arrive displaying each marking location at the end of the migratory path.

- (a) Briefly describe a method you could use to assign the marking locations if you wanted to ensure that exactly 600 butterflies were marked in each location.
- (b) Briefly describe a method you could use to assign the marking location if you wanted to be independent from one butterfly to the next, and wanted each location assigned with a probability $1/6$ each time.
- (c) Using your method of assignment from part (b), explain how you would analyze the data collected from this study.
- (d) If butterflies are marked using your method of assignment from part (a), would you change your method of analysis? Explain your reasoning.

Total: __/4