



“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.

A random sample of 400 married couples was selected from a large population of married couples.

- Heights of married men are approximately normally distributed with mean 70 inches and standard deviation 3 inches.
- Heights of married women are approximately normally distributed with mean 65 inches and standard deviation 2.5 inches.
- There were 20 couples in which the wife was taller than her husband, and there were 380 couples in which the wife was shorter than her husband.

Scoring:

- (a) Find a 95 percent confidence interval for the proportion of married couples in the population for which the wife is taller than her husband. Interpret your interval in the context of this question.

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- (b) Suppose that a married man is selected at random and a married woman is selected at random. Find the approximate probability that the woman will be taller than the man.

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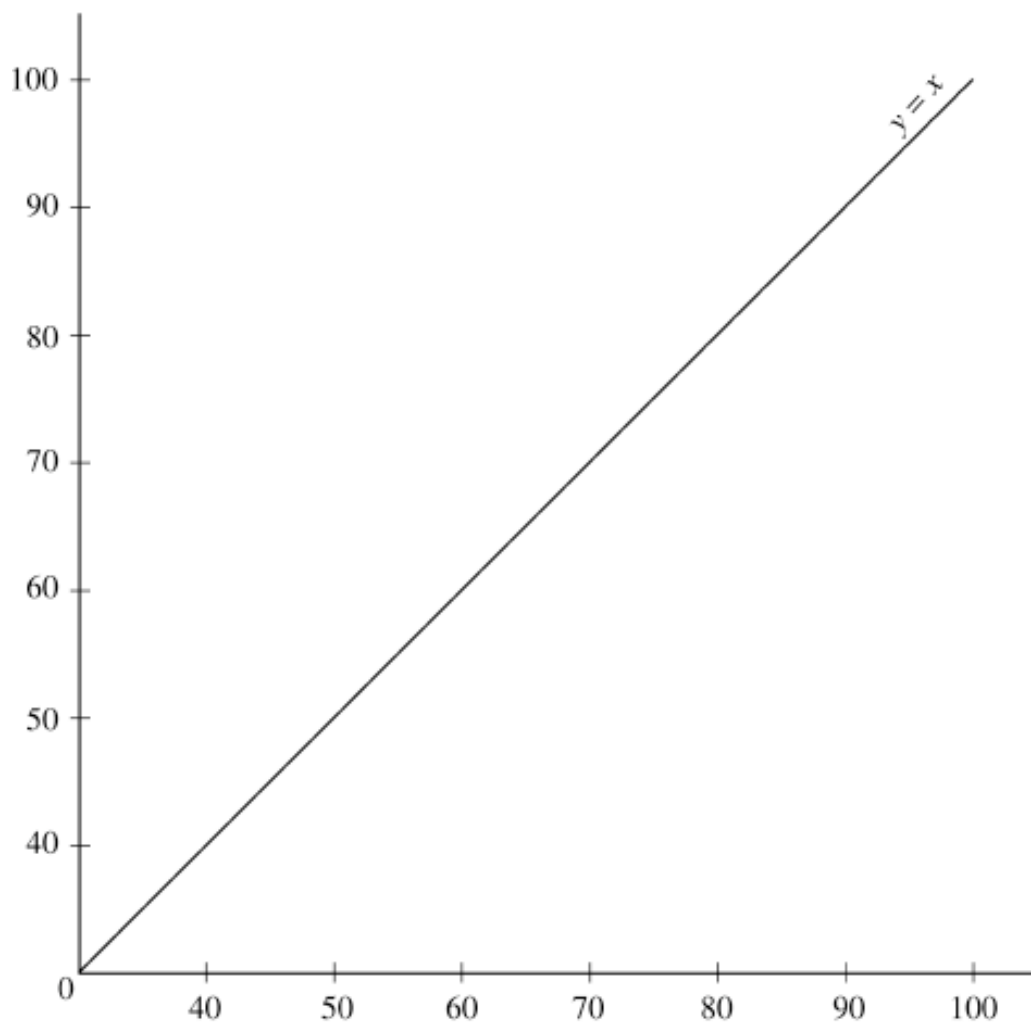
- (c) Based on your answers to (a) and (b), are the heights of wives and their husbands independent? Explain your reasoning.

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(d) A scatterplot (not shown) of husband's height versus wife's height for the 400 couples in the sample shows an approximately linear relationship with correlation 0.4. On the graph below, sketch an ellipse that could enclose the points on the scatterplot. Be sure to

- label your axes, and
- locate and orient your ellipse correctly with respect to the two axes and the line $y = x$.

Include any information that you think will be helpful in clarifying your sketch.



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