

Name KEY

Date _____

MAS 170
Elementary Statistics
Spring 2020
Sample Exam Problems

Instructions:

- Show work! Final answers given without supporting work receive no credit.
- All parts (a), (b), etc, are worth the same amount.
- A calculator is allowed, but no electronic devices with network capability are allowed.
- No books or notes are allowed.

1. Abigail is taking classes in Economics and History. Grades for both classes are based on one essay and one exam. Grades for both the essay and the exam are calculated by dividing points earned by total possible points. Grades for the class are determined by adding the total of points scored on the essay and the exam, then dividing that quantity by the total of possible points for the essay and the exam. For example, if Abigail scores 8 points out of 10 possible points on her Economics essay, and she scores 15 out of 20 possible points on her Economics exam, then her Economics essay grade is $8/10 = .8 = 80\%$, her Economics exam grade is $15/20 = .75 = 75\%$, and her Economics class grade is $(8 + 15)/(10 + 20) = 23/30 \approx .767 = 76.7\%$.

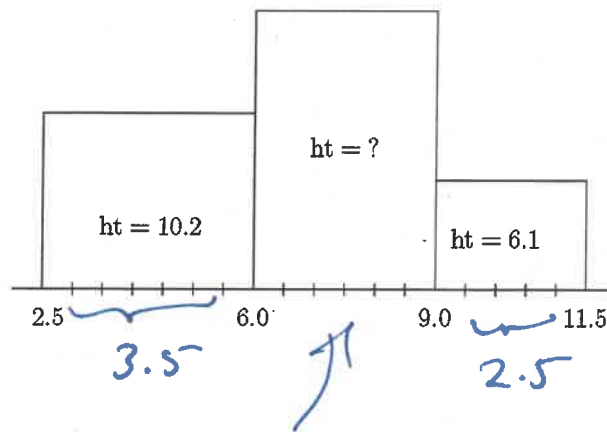
Now suppose that Abigail's Economics essay grade is higher than her History essay grade, and that her Economics exam grade is higher than her History exam grade. Is it possible for Abigail's overall History grade to be higher than her overall Economics grade? If yes, give an example, and discuss, using appropriate vocabulary from the reading and one or more complete sentences. If not, explain, using one or more complete sentences.

Yes.

	Econ		Hist	
Essay	$1/1$	$>$	$\frac{98}{100+99}$	98/100
Exam	$89/100$	$>$	$88/100 \times \frac{1}{2}$	
overall	$89/101$	$<$	$\frac{177}{200} \frac{99}{101}$	

This is an example of Simpson's paradox.

2. The total area in the three rectangles in the figure below is 100. Find the height of the middle rectangle.



$$\begin{aligned} \text{Area} &= 100 - (3.5)(10.2) - (2.5)(6.1) \\ &= 49.05 \end{aligned}$$

$$Ht = 49.05 / 3 = \boxed{16.35}$$