

**STAT220: WINTER 2006: QUIZ 2: FEB 2**

z	Area (percent)
0.0	0.0
0.5	38
1.0	68
1.5	86
2.0	95

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Student name

Section

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**1. Show your work**

In a large population of women, height is approximately normally distributed. The mean height is 65 inches and the SD is 4 inches. Weight is also approximately normally distributed, with mean 140 pounds and SD 10 pounds. In this population, there is a positive association between height and weight.

Mary is a member of this population. She is 63 inches tall and weighs 150 pounds.

(a) (2 points) What percentage of the population are smaller (in height) than Mary?

Mary's z-score for height is  $(63-65)/4 = -0.5$ .

The area outside 0.5 SD is  $(100-38) = 62\%$

One half of these are smaller than Mary (31%).

(b) (2 points) What percentage of the population weigh less than Mary?

Mary's z-score for weight is  $(150-140)/10 = 1$ .

The area outside 1 SD is  $(100-68) = 32\%$

So half of this is the women who weigh more than Mary: that is 16%.

So 84% weigh less.

(c) (2 points) How much weight must Mary lose to be at the 31st percentile for weight?

From (a), she would have to be 0.5 SD below the mean: that is  $(140-5)=135$  pounds.

She would have to lose  $(150-135) = 15$  pounds.

**2. Explain your answers**

We consider now a new population (Population-2). Population-2 consists of all the

**women in Population-1 who are taller than Mary.**

(a) (1 point) True or false? In Population-2, the mean height is larger than the median height.

True. The long positive tail pulls up the mean, relative to the median.

(b) (1 point) In Population-2, is the median height less than 67 inches, or more than 67 inches?

The median would divide this taller 69% of the population in half.

From 1(a), 38% of the original population are from 63 inches (Mary's height) to 67 inches.

And only 31% were taller than 67 inches.

So the median of this taller part must be less than 67 inches (although not much).

(c) (2 points) In Population-2, is the percentage who weigh more than Mary is less than 16%, or more than 16%?

In the original total population this was about 16%. (From 1(b)).

But now we have cut out the small people, who tend to weigh less, due to the positive association between height and weight. So of the ones who are left, more that 16% will weigh more than Mary.