Normal Distribution (*a very important continuous one*) Exercises

Pages	Suggested Reading
213 – 215	Section 5.1
255 – 264	Sections 6.1 through 6.6

Pages	Problems
89 – 102	(***Section 2.13***) 6, 9, 32
265 – 269	(***Section 6.8***) 1(b,c,d), 3(b,c), 5(all but b), 7(all but b), 9, 12-18

Showerheads at the Ramada hotel in Bishop, California are at a height of 68 inches from the ground (bottom of tub). Assume that to comfortably fit under a shower head, the showerhead needs to be at least 2 inches higher than your height (to the top of your head). Also assume that $\mu_{\text{men's height}} = 70$" with $\sigma_{\text{men's height}} = 3$", and the data are normally distributed.

E1. Find the percentage of men that can fit comfortably under this showerhead.

E2. Is this acceptable?

E3. Estimate the percentage of women that can fit comfortably under this showerhead. What assumption(s) did you make?

E4. At which height should the showerhead be placed so 95% of men can fit comfortably under it?

E5. Assuming that we place the showerhead at that height, what percentage of women will be comfortable under it (estimate)?

Answers.

E1. About 9%. Here's a video to help you if you get stuck!

E2. ***I*** don't think so…you?

E3. Hint: the average height of women is about ½ a foot less than that of men.

E4. 77" (P_{95} for men is about 75", so add 2 inches to that).

E5. I say 100%...I Googled the average height of women (64", per the US Dep. Of Health and Human Services) and assumed they had the same standard deviation as men.

Normal Distribution (*a very important continuous one*) Quizzes

Quiz 1.

In a standard normal distribution, find

1. (**2 points**) the percentage of ***z*** **-** scores on the standard normal curve that are above 1.96. In probability shorthand, this would look like " $p(z > 1.96)$ "

2. (**2 points**) $p(z < -1.645)$

3. (**2 points**) $p(-2.575 < z < 2.575)$

4. (**2 points**) P_{75} (that is, find the z – score that's the 75th percentile)

5. (**2 points**) P_{40}

Quiz 2.

Here's how we can use the normal distribution in a design sense: suppose that an airline wants to create seats that are more comfortable (shocking!). Adult American females have hips that average 14.4" wide, and these hips have a standard deviation of about 1.0" (http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA449852).

1. (**2 points**) (**w**) Most planes in the Northwest Airlines fleet have seats that are 17" wide (source: http://www.extend-its.com/seatsize.htm). Suppose that, to fit comfortably into one of these seats, an adult American female needs to have ½" of space on either side of her hips. What percent of Adult American females will fit comfortably into the seats on Northwest airlines planes? For "work", just take a screenshot of the technology you're using.

2. (**2 points**) (**w**) According to some researchers, Americans, in the future, will become overweight at increasingly terrifying levels (for example, as explained here: http://www.nature.com/oby/journal/v16/n10/full/oby2008351a.html). Suppose that, by 2050, adult American females' hip breadths will be 1" wider than they are now, on average (assume the standard deviation remains the same). If NW Air's seats are still 17", what proportion of adult females will comfortably fit in their seats in 2050? Same note about work!

3. **(2 points**) (**w**) Suppose that, for the 2050 predicted parameters (μ = 15.4 and σ = 1), NW Air wants to guarantee that 99.9% of adult American women fit comfortably into their seats. What seat width would allow this? Nearest ½", please…and remember to add the 1" of wiggle room back in!

4. **(2 points**) (**w**) How about 99.99%?

5. **(2 points**) (**w**) 99.999%?