**Groupwork PS 5.5**

**Your Name:** **Group #:**

## Identify Unusual observations

**Definition:** Assume that a distribution is normal or approximately normal. An observation is **unusual** if it is more than 1.96 standard deviations away from the mean.

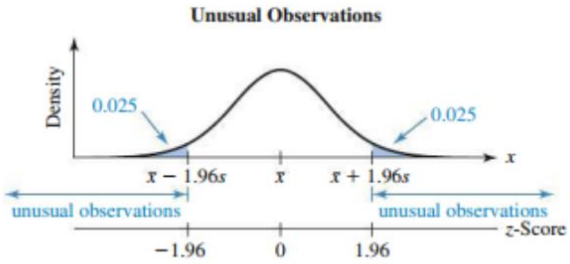



Figure 100 Unusual observations are more than 1.96 standard deviations away from the mean

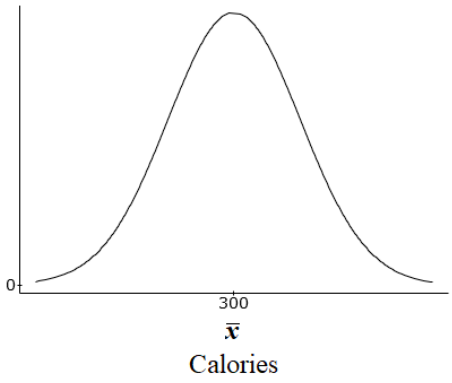
## Investigating whether a claim is true

**1)** A fast food chain offers a new, "healthier" burger, claiming it has on average only 300 calories. For a science experiment, you purchase one of these burgers and incinerate it in a bomb calorimeter. While waiting for the results, you're thinking that for an indicated 300 calories to really be meaningful to the customer base, approximately 95% of all such burgers sold should, in actuality, have somewhere between 260 and 340 calories. When the results come back, it turns out that the hamburger had 400 calories. Assume the distribution of caloric content in these healthier burgers is approximately normally distributed to answer the following questions.

**a)** What mean should you use for this investigation?

**b)** Based on the empirical rule, what standard deviation would put the caloric content of approximately 95% of all burgers sold in between 260 and 340 calories?

**c)** Based on your response to parts (a) and (b), what is the probability that one of these "healthier" burgers has at least 400 calories? (Complete the sketch of the bell curve by shading in what the corresponding area under the bell curve might look like, and labelling things as appropriate. We can figure out the probability together if computers are not available)



**d)** Assuming these burgers actually do have 300 calories, on average, and that the expectation that 95% of these burgers will actually have between 260 to 340 calories is a reasonable expectation, is the observation of 400 calories in the tested burger an unusual event?

**e)** Describe a scenario in which one of these healthier burgers having 400 calories would not be an unusual event.

**f)** Based on the observed caloric content of 400 calories in the test burger, is the assumed mean and/or standard deviation of caloric content in these burgers reasonable?

**g)** What is the implication if the assumed mean is not reasonable?

**h)** What is the implication if the standard deviation used is not reasonable?

**I)** Should a more thorough investigation occur? Lawyers want to know if they can make any money off of this.