

Homework 3

Daniel Dittenhafer

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3.2 Area under the curve Part II (p158)

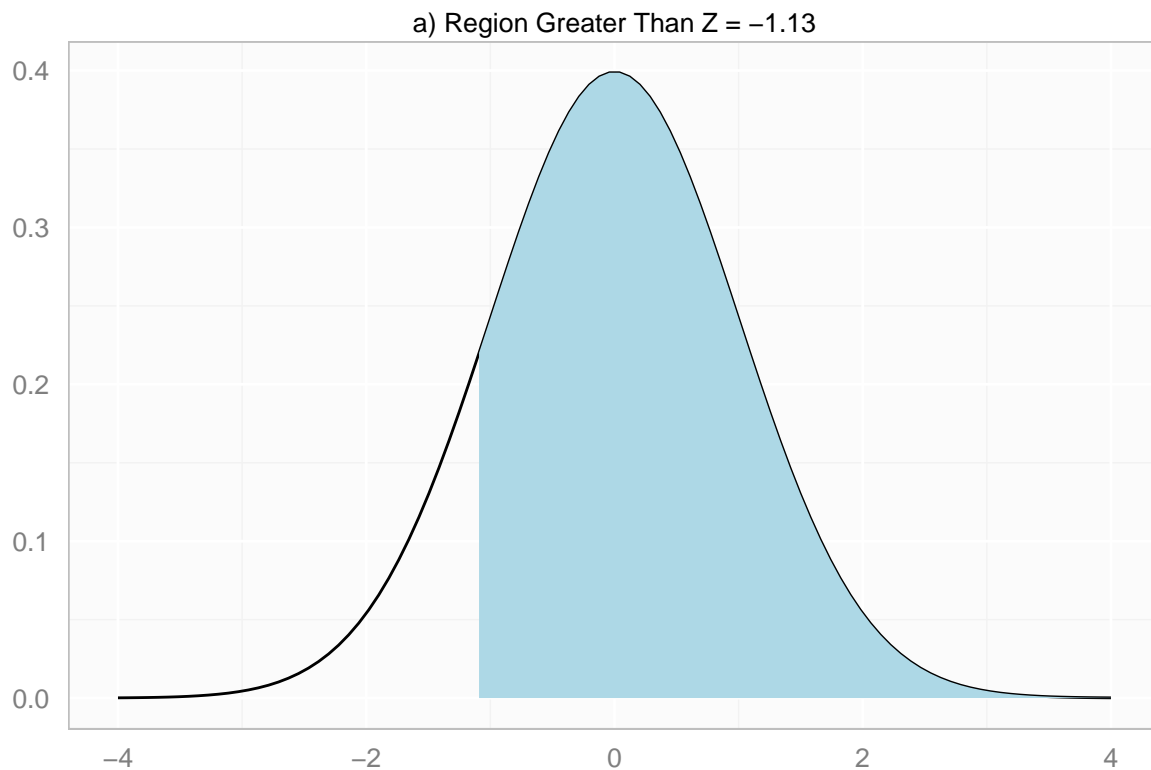
What percent of a standard normal distribution $N(\mu = 0, \sigma = 1)$ is found in each region? Be sure to draw a graph.

a. $Z > -1.13$ First, we define in R code the Z score and then use the `pnorm` function to determine the percentage on the left tail. Subtract this value from 1 to find the right tail value.

```
zGt <- -1.13  
pGt <- 1 - pnorm(zGt)  
pGt
```

```
## [1] 0.8707619
```

The percent of the standard normal distribution found in the region $Z > -1.13$ is 0.8707619.

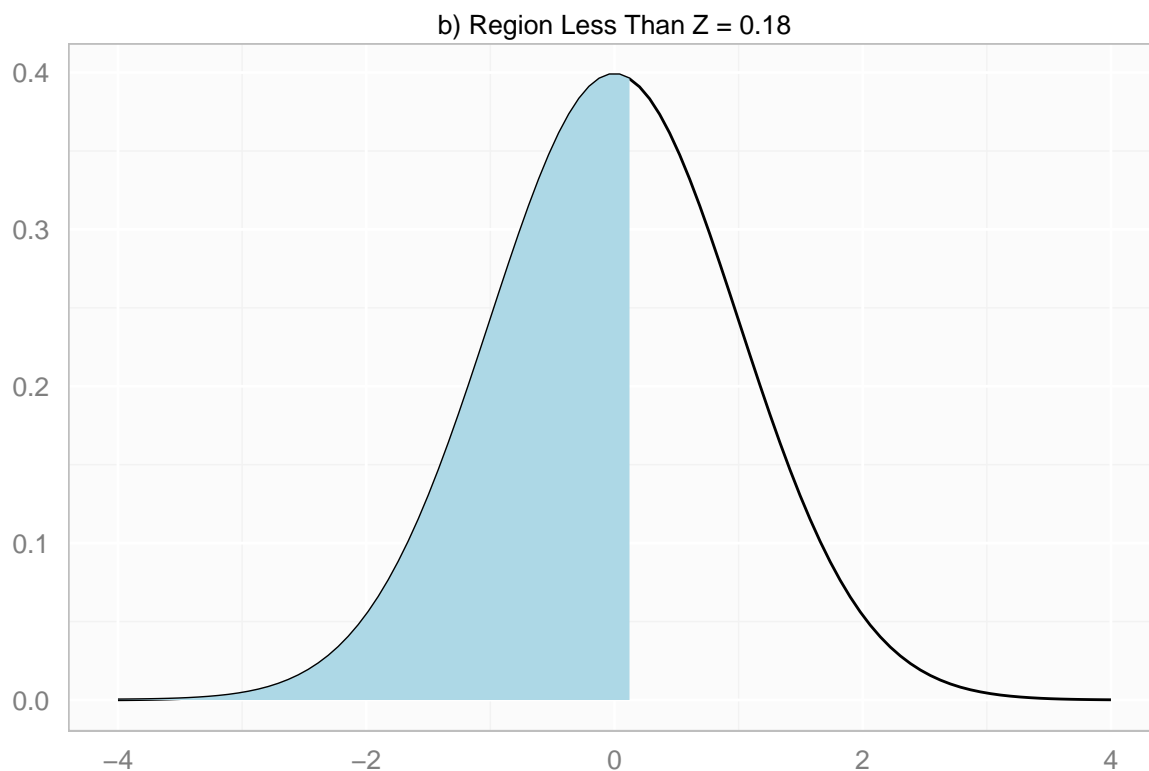


b. $Z < 0.18$ First, we define in R code the Z score and then use the `pnorm` function to determine the percentage on the left tail (less than).

```
zLt <- 0.18
pLt <- pnorm(zLt)
pLt
```

```
## [1] 0.5714237
```

The percent of the standard normal distribution found in the region $Z < 0.18$ is 0.5714237.

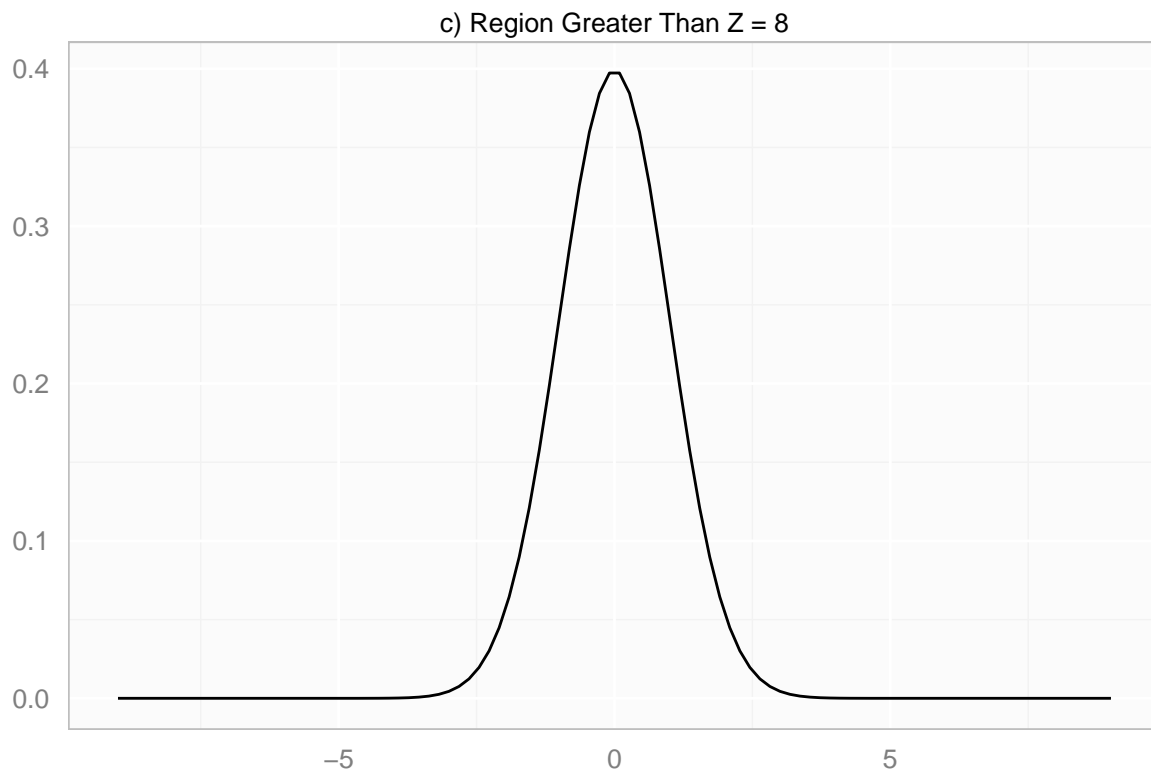


c. $Z > 8$ Again, we define in R code the Z score and then use the `pnorm` function to determine the percentage on the right tail (greater than).

```
zGt <- 8
pGt <- 1 - pnorm(zGt)
round(pGt, 4)
```

```
## [1] 0
```

The percent of the standard normal distribution found in the region $Z > 8$ is 0. This particular scenario is so extreme that it doesn't even show on the visualization.

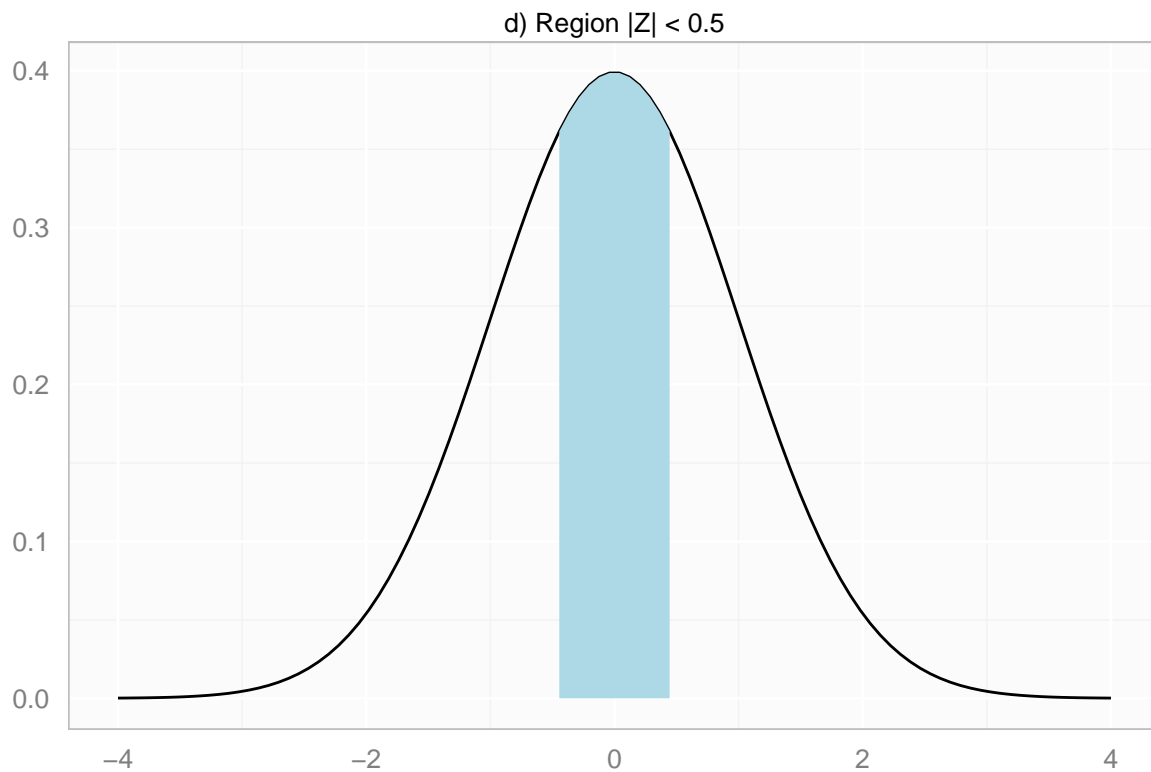


d. $|Z| < 0.5$ Again, we define in R code the Z score and then use the `pnorm` function to determine the percentage on the left tail. Due to the absolute value sign on the Z, we are looking for the middle region and subtract the `pnorm` value from 0.5. Also, this becomes a two tail-like question and we therefore double the value resulting from the `pnorm` subtraction.

```
zAbs <- 0.5  
pAbs <- 2 * (0.5 - pnorm(-1 * zAbs))  
round(pAbs, 4)
```

```
## [1] 0.3829
```

The percent of the standard normal distribution found in the region $|Z| < 0.5$ is 0.3829.



3.4 Triathlon times, Part I (p158)

Racer	Group	Time (sec)
Leo	Men, 30 - 34	4948
Mary	Women, 25 - 29	5513

Group	Mean	Stdev
Men, 30-34	4313	583
Women, 25-29	5261	807

- Normally distributed finishing times for both groups

a) **Write down the short-hand for these two normal distributions.** The short-hand for these two normal distributions follows:

Men, 30-34: $N(\mu = 4313, \sigma = 583)$

Women, 25-29: $N(\mu = 5261, \sigma = 807)$

b) **What are the Z-scores for Leo's and Mary's finishing times? What do these Z-score tell you?** Using R, we define the mean, standard deviation and individual times. Then we compute the Z score using the equation $Z = \frac{x - \mu}{\sigma}$ for Leo and Mary.

```
men3034mean <- 4313
men3034sd <- 583
leoTime <- 4948

leoZc <- (leoTime - men3034mean) / men3034sd
leoZc
```

```
## [1] 1.089194
```

```
women3034mean <- 5261
women3034sd <- 807
maryTime <- 5513

maryZc <- (maryTime - women3034mean) / women3034sd
maryZc
```

```
## [1] 0.3122677
```

3.18 (p?)

3.22 (p?)

3.38 (p?)

3.42 (p?)