Homework assignment #6

Amber Vasquez

Oct 2021

Textbook exercises

Problem 1. $(1 + 1 + 1 + 2 = 5$ points)

Solve **Problem 4.2** from the textbook. a) 87% b) 57% c) 0% d) 38%

```
#(a) Z > -1.13
mu <- 0
sd <- 1
Z <- -1.13
x <- Z * sd + mu
y = 0
1 - pnorm(x, mean = 0, sd = 1)
## [1] 0.8707619
```

```
#(b) Z < 0.18
mu <- 0
sd <- 1
Z <- 0.18
# finding value for 'x'
x <- Z * sd + mu
# Finding probability fo x < 0.18
pnorm(x, mean = 0, sd = 1)
## [1] 0.5714237
```

```
#(c) Z > 8
mu <- 0
sd <- 1
Z <- 8
x <- Z * sd + mu
1 - pnorm(x, mean = 0, sd = 1)
## [1] 6.661338e-16
```

```
# (d) |Z| < 0.5
mu <- 0
sd <- 1
Z <- 0.5
x <- Z * sd + mu
x1 <- pnorm(-x, mean = 0, sd = 1)
x2 <- pnorm(x, mean = 0, sd = 1)
```

```
x2 - x1
## [1] 0.3829249
```

Solution:

Problem 2. ($1+3+2+2+2+3=13$ points)

Solve **Problem 4.4** from the textbook.

Solution: on other paper

Problem 3. ($3+3=6$ points)

Solve **Problem 4.6** from the textbook.

Solution: on other paper

Problem 4. ($3+3=6$ points)

Solve **Problem 4.8** from the textbook.

Solution: on other paper

Problem 5. (5 points)

Solve **Problem 4.10** from the textbook.

*Solution:*on other paper

Additional problems

Problem 6. ($3 \times 2 = 6$ points)

Let Z be a standard normal random variable. Using the standard normal tables, calculate the following probabilities:

(i) $\mathbb{P}[-1.23 < Z < 2.37]$

(ii) $\mathbb{P}[1/Z < 1]$

(iii) $\mathbb{P}[Z^2 > 2.56]$

Solution:

```
# (i)
pnorm(2.37)- pnorm(-1.23)
## [1] 0.8817574
# (ii)
pnorm(0)+1- pnorm(1)
## [1] 0.6586553
# (iii)
2* pnorm(-1.6)
## [1] 0.1095986
```

Problem 7. ($4 + 5 = 9$ points)

Source: Problem #139 from Moore-McCabe-Craig.

The interquartile range (IQR) of a distribution is defined as the distance between the first and the third quartiles.

(i) (4 points) What is the IQR for the standard normal distribution?

(ii) (5 points) What is the IQR for a normal distribution with mean μ and variance σ^2?

Solution:

```
# (i)
qnorm(0.75)
## [1] 0.6744898
qnorm(0.25)
## [1] -0.6744898
# (ii)
#Z = x-mu/sigma
#x = mu + sigmaZ
qnorm(0.75)- qnorm(0.25)
## [1] 1.34898
```