Homework 2

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# Exercise 4.4.4: What is the probability that an individual selected at random used:

# A. Five addictive substances?

0.0501

# B. Fewer than three addictive substances?

0.6255 = 0.1853+0.4402

# C. More than six addictive substances?

0.0232 = 0.0077+0.0116+0.0026+0.0013

# D. Between two and five adivctive substances, inclusive?

0.7659 = 0.4402+0.1828+0.0927+0.0502

substance\_use\_data = data.frame(  
 frequency = c(144,342,142,72,39,20,6,9,2,1)  
 )  
probability = substance\_use\_data$frequency/777  
substance\_use\_data <- cbind(substance\_use\_data,probability)  
#plot(substance\_use\_data$probability)  
substance\_use\_data

## frequency probability  
## 1 144 0.185328185  
## 2 342 0.440154440  
## 3 142 0.182754183  
## 4 72 0.092664093  
## 5 39 0.050193050  
## 6 20 0.025740026  
## 7 6 0.007722008  
## 8 9 0.011583012  
## 9 2 0.002574003  
## 10 1 0.001287001

# Exercise 4.6.2: Given the standard normal distribution find the probability that a z picked at random will have a value between z = -2.87 and z = 2.64.

pnorm(2.64) - pnorm(-2.87)

## [1] 0.9938023

# Exercise 4.6.4: P(z>= -0.55)

1.0 - pnorm(-0.55)

## [1] 0.7088403

# Exercise 4.6.6: P(z<2.33)

pnorm(2.33)

## [1] 0.9900969

# Exercise 4.6.8: P(-2.58<=z<=2.58)

pnorm(2.58) - pnorm(-2.58)

## [1] 0.99012

# Exercise 4.6.10: P(z=0.74)

dnorm(0.74,0,1)

## [1] 0.3033893

# Exercise 4.6.12: P(-2.67<=z<=z) = 0.9718

qnorm(0.9718+pnorm(-2.67))

## [1] 1.970205

# Exercise 4.6.14: P(z<=z<=2.98) = 0.1117

qnorm(pnorm(2.98)-0.1117)

## [1] 1.209991

# Exercise 4.7.2

MEAN = 140  
SD = 50  
A = pnorm(200, lower.tail = F, mean=MEAN, sd=SD)  
B = pnorm(100, lower.tail = T, mean=MEAN, sd=SD)  
  
print(A)

## [1] 0.1150697

print(B)

## [1] 0.2118554

# Exercise 4.7.6

MEAN = 75  
SD = 25 #variance = 625  
  
#A = P(50<=x<=100)  
A = pnorm(100, lower.tail = T, mean=MEAN, sd=SD)-pnorm(50, lower.tail = T, mean=MEAN, sd=SD)  
  
#B = P(x>90)  
B = pnorm(90, lower.tail = F, mean=MEAN, sd=SD)  
  
#C = P(x<60)  
C = pnorm(60, lower.tail = T, mean=MEAN, sd=SD)  
  
#D = P(x>=85)  
D = pnorm(85, lower.tail = F, mean=MEAN, sd=SD)  
  
#E = P(30<=x<=110)  
E = pnorm(110, lower.tail = T, mean=MEAN, sd=SD)-pnorm(30, lower.tail = T, mean=MEAN, sd=SD)  
  
print(A)

## [1] 0.6826895

print(B)

## [1] 0.2742531

print(C)

## [1] 0.2742531

print(D)

## [1] 0.3445783

print(E)

## [1] 0.883313

# Review question 18 (Assume sd = 1.0)

m = 2.0  
SD = 1  
#A = dnorm(3,m,sd) Why won't dnorm knit with non-numeric arguments? error on knitting.  
A = dnorm(3,2.0,1)  
B = pnorm(2,lower.tail = T, mean = m, sd = SD)  
C = pnorm(5,lower.tail = T, mean = m, sd = SD) - pnorm(3,lower.tail = T, mean = m, sd = SD)  
  
print(A)

## [1] 0.2419707

print(B)

## [1] 0.5

print(C)

## [1] 0.1573054

# Review question 22

m = 10  
SD = 3  
A = pnorm(4,lower.tail = T, mean = m, sd = SD)  
B = pnorm(5,lower.tail = F, mean = m, sd = SD)  
C = pnorm(3,lower.tail = T, mean = m, sd = SD)  
   
print(A)

## [1] 0.02275013

print(B)

## [1] 0.9522096

print(C)

## [1] 0.009815329

# Review question 26

P = 1-0.754  
P\_onetail = P/2  
z = -1 \* qnorm(P\_onetail)  
print(paste("k = ", z))

## [1] "k = 1.16011988299752"

# Review question 28

P = 0.008  
SD = 10  
X=40 #P(x<=40)  
z = qnorm(P)  
# z = (x-u)/SD  
u = (z\*SD - X)\*-1  
print(u)

## [1] 64.08916

# Review question 30

P = 0.0526  
SD = 5  
X=25 #P(x>=25)  
z = qnorm(P,lower.tail = F)  
# z = (x-u)/SD  
u = (z\*SD - X)\*-1  
print(u)

## [1] 16.89925

# Review question 32

P = 0.9772  
u = 30  
X = 50 #P(x<=50)  
z = qnorm(P, lower.tail = T)  
#z = (x-u)/SD  
SD = (X-u)/z  
print(SD)

## [1] 10.00462