

# STAT 260 R Assignment 2

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## Question 1

a)

1.

```
p <- 0.0065
n <- 500
prob_7_cracked <- dbinom(7, size = n, prob = p)
prob_7_cracked
```

```
## [1] 0.02925457
```

2.

```
n <- 3000
prob_20_to_25_cracked <- sum(dbinom(20:25, size = n, prob = p))
prob_20_to_25_cracked
```

```
## [1] 0.3944213
```

b)

```
lambda <- 4.8 * 10
prob_50_earthquakes <- dpois(50, lambda = lambda)
prob_50_earthquakes
```

```
## [1] 0.05405699
```

c)

```
mean_zinc <- 159
sd_zinc <- 13.1
prob_zinc_between_160_165 <- pnorm(165, mean = mean_zinc, sd = sd_zinc) - pnorm(160, mean = mean_zinc, sd = sd_zinc)
prob_zinc_between_160_165
```

```
## [1] 0.1461052
```

d)

```
alpha <- 3.4
beta <- 2.8
prob_lifespan_no_more_than_7 <- pgamma(7, shape = alpha, scale = beta)
prob_lifespan_no_more_than_7
```

```
## [1] 0.3619324
```

## Question 2

a)

```
p_fail <- 0.0021
n_letters <- 4000
lambda <- n_letters * p_fail
prob_poisson_10_or_more <- 1 - ppois(9, lambda = lambda)
prob_poisson_10_or_more
```

```
## [1] 0.3340803
```

b)

```
mean_fail <- n_letters * p_fail
sd_fail <- sqrt(n_letters * p_fail * (1 - p_fail))
prob_normal_10_or_more_cont <- 1 - pnorm(9.5, mean = mean_fail, sd = sd_fail)
prob_normal_10_or_more_cont
```

```
## [1] 0.3519968
```

c)

```
prob_normal_10_or_more_no_cont <- 1 - pnorm(10, mean = mean_fail, sd = sd_fail)
prob_normal_10_or_more_no_cont
```

```
## [1] 0.2902574
```

d)

```
prob_binom_10_or_more <- 1 - pbinom(9, size = n_letters, prob = p_fail)
prob_binom_10_or_more
```

```
## [1] 0.3339988
```

## Question 3

a)

```
lambda <- 4.3
fish_per_day_week <- rpois(7, lambda = lambda)
fish_per_day_week
```

```
## [1] 3 6 3 2 8 2 2
```

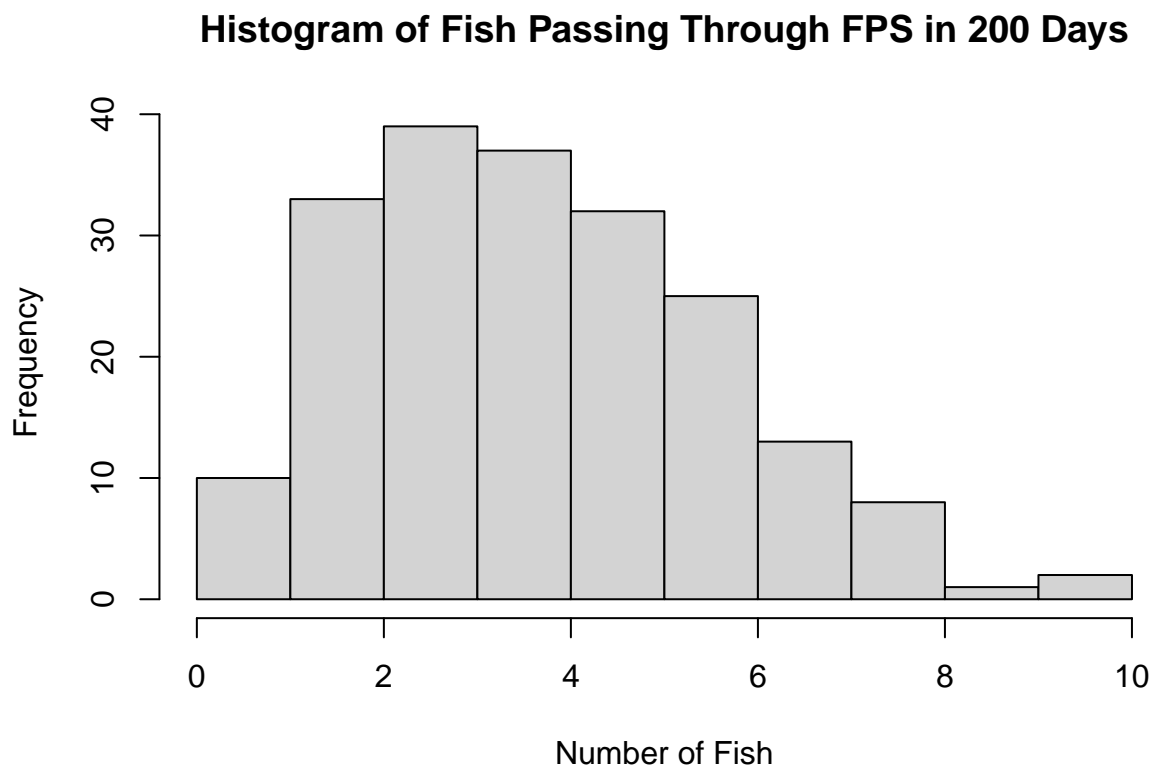
b)

```
fish_per_day_200 <- rpois(200, lambda = lambda)
fish_per_day_200
```

```
## [1] 4 3 2 5 5 5 3 1 7 4 7 2 3 6 2 2 5 5 3 6 2 4 3 3 5
## [26] 7 4 5 4 2 3 2 2 4 6 3 8 2 7 5 6 3 2 6 5 7 3 2 4 6
## [51] 3 2 2 4 4 3 4 4 5 2 2 4 1 7 8 6 3 7 2 5 3 5 4 6 5
## [76] 3 3 5 3 3 4 0 7 1 8 4 2 4 1 2 3 10 4 6 5 6 4 3 4 4
## [101] 3 8 6 5 2 4 8 4 5 6 2 4 6 2 6 3 3 6 7 6 2 5 6 6 6
## [126] 7 6 4 5 6 8 5 3 10 5 3 9 3 4 3 4 3 4 4 2 6 2 3 4 5
## [151] 3 7 7 5 1 4 5 5 5 4 2 6 3 2 6 3 4 2 4 4 3 8 5 8 3
## [176] 7 5 2 3 3 3 2 6 1 2 3 4 4 5 5 0 1 4 2 2 1 5 3 5 2
```

c)

```
hist(fish_per_day_200, main = "Histogram of Fish Passing Through FPS in 200 Days", xlab = "Number of Fish")
```



d)

```
mean_fish_200 <- mean(fish_per_day_200)
mean_fish_200
```

```
## [1] 4.165
```

```
theoretical_mean <- lambda
theoretical_mean
```

```
## [1] 4.3
```