DATA605 HW 5

Avery Davidowitz

2022-09-25

Question 1 - Bayesian

```
#part A
sens <- .96
spec <- .98
prev <- .001

bayesian <- (sens * prev)/((sens * prev) + (1 - spec) * (1 - prev))
print(bayesian)
```

```
## [1] 0.04584527
```

```
#Part B - cost
(100000 * 1000)+(100000 * bayesian)
```

```
## [1] 100004585
```

Question 2 - Binomial

```
prob <- .05
num_months <- 24
```

What is the probability that, after 24 months, you received exactly 2 inspections?

```
dbinom(2, num_months, prob)
```

```
## [1] 0.2232381
```

What is the probability that, after 24 months, you received 2 or more inspections?

```
1 - (dbinom(1, num_months, prob)) - (dbinom(0, num_months, prob))
```

```
## [1] 0.3391827
```

What is the probability that your received fewer than 2 inspections?

```
1 - (1-(dbinom(1, num_months, prob)) - (dbinom(0, num_months, prob)))
```

```
## [1] 0.6608173
```

What is the expected number of inspections you should have received? What is the standard deviation?

```
#EV
prob * num_months
```

```
## [1] 1.2
```

```
#SD
(prob * num_months * (1-prob))^(1/2)
```

```
## [1] 1.067708
```

Question 3 - Poisson

```
rate <- 10 #per hour
```

What is the probability that exactly 3 arrive in one hour?

```
dpois(3, rate)
```

```
## [1] 0.007566655
```

What is the probability that more than 10 arrive in one hour?

```
1 - ppois(10, rate)
```

```
## [1] 0.4169602
```

How many would you expect to arrive in 8 hours?

```
#EV per 8 hours
8*rate
```

```
## [1] 80
```

What is the standard deviation of the appropriate probability distribution? Square root(10)

If there are three family practice providers that can see 24 templated patients each day, what is the percent utilization and what are your recommendations?

```
(8 * rate) / (24 * 3)
```

```
## [1] 1.111111
```

Question 4 - Hypergeometric

If your subordinate acted innocently, what was the probability he/she would have selected five nurses for the trips?

```
dhyper(5,15,15,6)
```

```
## [1] 0.07586207
```

How many nurses would we have expected your subordinate to send? 6 * (15/30) How many non-nurses would we have expected your subordinate to send? 6 * (15/30) ## Question 5 - Geometric

```
prob <- .001 #per hour
hours <- 1200 #per year
```

What is the probability that the driver will be seriously injured during the course of the year?

```
pgeom(hours, prob)
```

```
## [1] 0.6992876
```

In the course of 15 months?

```
pgeom(hours*15/12, prob)
```

```
## [1] 0.7772602
```

What is the expected number of hours that a driver will drive before being seriously injured?

```
#EV = 1-p/p
(1-prob) / prob
```

```
## [1] 999
```

Given that a driver has driven 1200 hours, what is the probability that he or she will be injured in the next 100 hours?

Question 6

What is the probability that the generator will fail more than twice in 1000 hours?

```
1 - ppois(2,1)
```

```
## [1] 0.0803014
```

What is the expected value? 1000 hours

Question 7

What is the probability that this patient will wait more than 10 minutes?

```r
1-punif(10,0,30)
```

```
## [1] 0.6666667
```

EV = .5*(0+30)

Question 8

What is the expected failure time? EV = 10