CH 3.5

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10/17/2018

MATH 324 Ch 3.5

Negative Binomial and Hypergeometric Practice:

1A)

N = 20 individuals ; M = 10 taking the test for the first time ; n = 5 sample size ; X = the number among the five who are taking the test for the first time ;

1B)

X = 2

```
dhyper(2, 10, 10, 5)
```

```
## [1] 0.3482972
```

X <= 2 P(X=0) + P(X=1) + P(X=2)

```
dhyper(0,10,10,5) + dhyper(1,10,10,5) + dhyper(2,10,10,5)
```

```
## [1] 0.5
```

X >= 2 P(X=2) + P(X>2)

```
dhyper(2,10,10,5) + 1 - dhyper(0,10,10,5) + dhyper(1,10,10,5) + dhyper(2,10,10,5)
```

```
## [1] 1.815789
```

1C)

mean = nM/N

```
(5*10)/20
```

```
## [1] 2.5
```

standard deviation

```
sqrt((20-5/20-1)*2.5*(1-(10/20)))
```

```
## [1] 4.841229
```

2A)

p = 0.1 ; r = 2 ; x = 0.9 ; r = Number of successes ; p = Pr(getting the skin) ; x = number of failures ; dnbinom(x, 2, 0.1) ; (x+1)(0.1)^2*(0.9)^x ;

2B)

After obtained two of the prizes ; 1(W),1(L),1(W),1(L),1(??? never reach because two prizes has been obtained) ; or 1(L),1(W),1(L),1(W),1(L) ;

```
dnbinom(2, 2, 0.1)
```

```
## [1] 0.0243
```

2C)

P(X<=2) P(X=0) + P(X=1) + P(X=2)

```
dnbinom(0,2,0.1) + dnbinom(1,2,0.1) + dnbinom(2,2,0.1)
```

```
## [1] 0.0523
```

2D)

E(X) = r(1-p)/p

```
a <- ((2*(1-0.1))/0.1)
paste0(a)
```

```
## [1] "18"
```

Poisson Practice

3A)

X <= 15

```
ppois(15, 20)
```

```
## [1] 0.1565131
```

3B)

X > 25

```
1 - ppois(25, 20)
```

```
## [1] 0.112185
```

3C)

P(20-2(sqrt(20))) <= X <= P(20+2(sqrt(20))) ; sqrt(20) = 4.47213595 ; = P(12 <= X <= 28) ;

```
ppois(28, 20) - ppois(11,20)
```

```
## [1] 0.9442797
```

Some Data Collection about Student Learning

Doing the homework