MATH 324 Homework 3

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Problem 1

```r
# x = 6
# n = 15
# unfair die with p = 0.45.

dbinom(6, 15, 0.45)
```

```
## [1] 0.1914006
```

Problem 1 Pat B

```r
# x = 7
# n = 30
# fair die with desired outcome p = 1/6.

dbinom(7, 30, 1/6)
```

```
## [1] 0.1097761
```

Problem 1 Part C

```r
# x = 10
# n = 30
# choices are A,B,C,D,E so p = 1/5 or 0.2.

dbinom(10, 30, 1/5)
```

```
## [1] 0.03547089
```

Problem 2 Part A

```r
# n = 120
# p = 18% or 0.18
# how many people out of the 120 random sample have a college degree.

mu = 0.18*120
mu
```

```
## [1] 21.6
```

```r
sigma_sq = (0.18*120)*(1-0.18)
sigma_sq
```

```
## [1] 17.712
```

```r
sigma = sqrt(sigma_sq)
sigma
```

```
## [1] 4.208563
```

Problem 2 Part C

```r
# a = 19
# b = 26
# p = 0.18
# n = 120

sum(dbinom(19:26, 120, 0.18))
```

```
## [1] 0.6421029
```

Problem 3 Parts A & B

```r
# p = 0.95
# n = 80
# manufacturer is 95% sure that his batteries will last at least 22 hours in standard testing.

sum(dbinom(75:80, 80, 0.95))
```

```
## [1] 0.7892247
```

```r
sum(dbinom(0:4, 80, 0.05))
```

```
## [1] 0.6288798
```

Problem 4 Parts A & B

```r
qbinom(0.05, 8, 0.6)
```

```
## [1] 3
```

```r
pbinom(3, 8, 0.6)
```

```
## [1] 0.1736704
```

```r
#I got that three gave us the closest approximation to the probability that was given.

pbinom(2, 8, 0.6)
```

```
## [1] 0.04980736
```

```r
#X must be 3, because that is the closest value for x that gives us the approximation we want.

qbinom(0.2, 8, 0.6, lower.tail = F)
```

```
## [1] 6
```

```r
#Testing the number 6.
1 - pbinom(5, 8, 0.6)
```

```
## [1] 0.3153946
```

```r
#6 was a little higher than the value we wanted. Thus we will test 7.
1 - pbinom(6, 8, 0.6)
```

```
## [1] 0.1063757
```

```r
#Thus x has to be 6.
```

In the above chunk, I discovered that the qbinom function works for P(X <= x). Using this function, I got the number 3. I did the same thing, but "backwards" utilizing the central limit theorem.