Data-580 Lab 2

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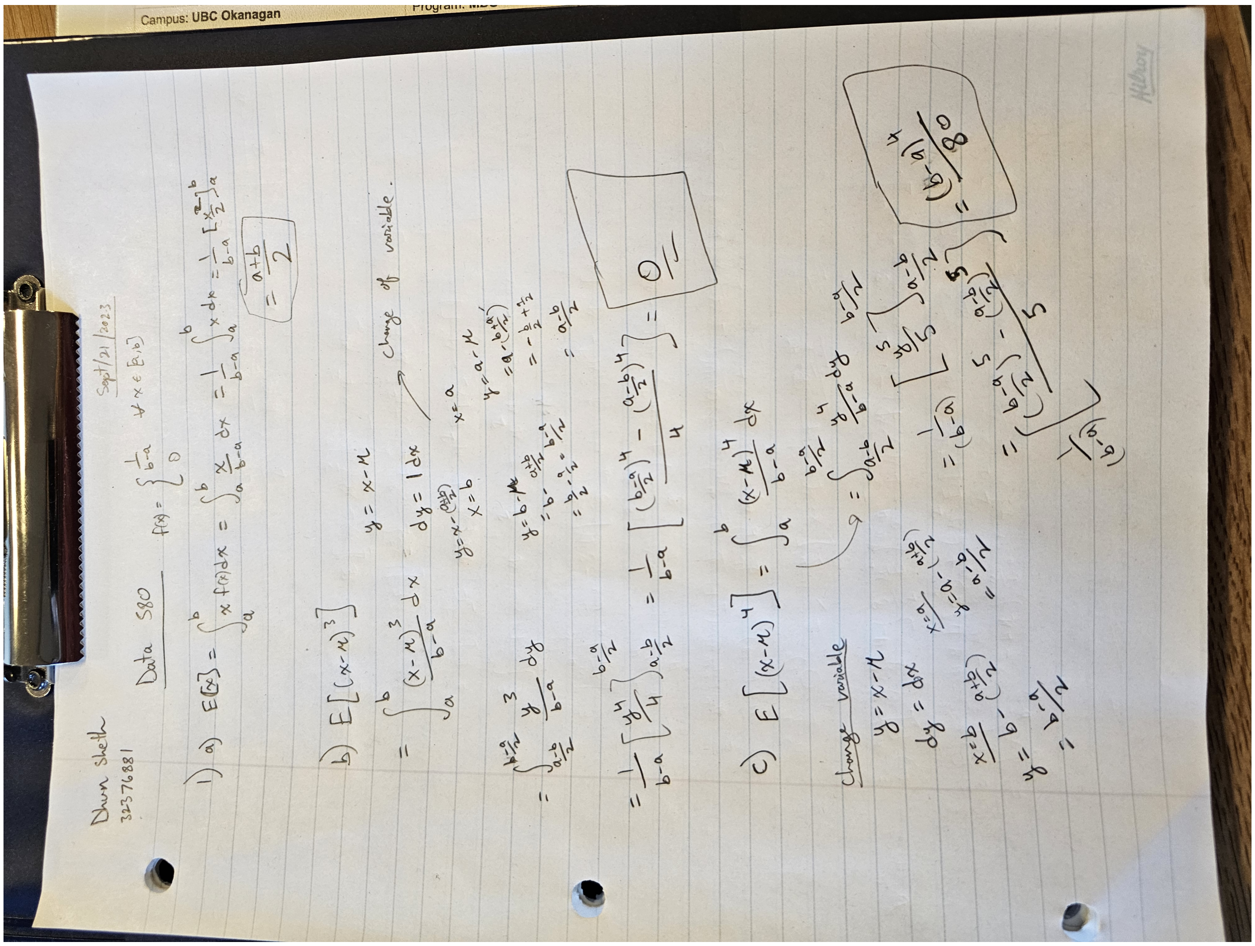
Question 1

```r
knitr::include_graphics("dhun-data580-Lab2-question1.jpg")
```



Question 2

Part A

```r
x <- runif(100000, min=0, max=1)

m <- mean(x)
print(m)
```

```
## [1] 0.50149
```

Computed mean of x is 0.50149
Theoretical mean is (a+b)/2 = (0+1)/2 = 0.5

Part B

```r
k <- mean( (x-mean(x))**3 )

print(k)
```

```
## [1] -0.0001526693
```

Computed value of skewness is $-1.5266931 \times 10^{-4}$
Theoretical skewness of uniform distribution is 0.

Question 3

Part A

```r
binsim<- rbinom(10000,20,0.3)

prob_less_than_or_equal_to_5 <- sum(binsim <= 5)/10000
print(prob_less_than_or_equal_to_5)
```

```
## [1] 0.4153
```

Simulated P(X <= 5) = 0.4153

Part B

```r
prob_equal_5 <- sum(binsim == 5)/10000
print(prob_equal_5)
```

```
## [1] 0.1811
```

Simulated P(X = 5) = 0.1811

Part C

```r
mean_binsim <- mean(binsim)
print(mean_binsim)
```

```
## [1] 6.0113
```

Simulated mean of binsim is 6.0113

Part D

```r
var_binsim <- var(binsim)
print(var_binsim)
```

```
## [1] 4.152788
```

Simulated var of binsim is 4.1527876

Question 4

```r
pois<- rpois(10000,7.2)

m_pois<-mean(pois)
var_pois<-var(pois)
print(m_pois)
```

```
## [1] 7.2207
```

```r
print(var_pois)
```

```
## [1] 7.261318
```

Simulated mean of Poisson is 7.2207 and variance is 7.2613176
Theoretical mean and variance is 7.2.

Question 5

Part A

```r
p1<- rpois(10000,5)
p2<- rpois(10000,25)
p3<- rpois(10000,125)
p4<- rpois(10000,625)

p1_mean<- mean(p1)
p2_mean<- mean(p2)
```

```r
p3_mean<- mean(p3)
p4_mean<- mean(p4)

print(p1_mean)
```

```
## [1] 4.9907
```

```r
print(p2_mean)
```

```
## [1] 24.931
```

```r
print(p3_mean)
```

```
## [1] 124.9927
```

```r
print(p4_mean)
```

```
## [1] 625.0981
```

Part B

```r
p1_log_mean<- mean(log(1+p1))
p2_log_mean<- mean(log(1+p2))
p3_log_mean<- mean(log(1+p3))
p4_log_mean<- mean(log(1+p4))

print(p1_log_mean)
```

```
## [1] 1.710925
```

```r
print(p2_log_mean)
```

```
## [1] 3.23638
```

```r
print(p3_log_mean)
```

```
## [1] 4.832203
```

```r
print(p4_log_mean)
```

```
## [1] 6.43871
```

Part C

```r
p1_root_mean<- mean(sqrt(p1))
p2_root_mean<- mean(sqrt(p2))
p3_root_mean<- mean(sqrt(p3))
p4_root_mean<- mean(sqrt(p4))

print(p1_root_mean)
```

```
## [1] 2.167722
```

```r
print(p2_root_mean)
```

```
## [1] 4.967661
```

```r
print(p3_root_mean)
```

```
## [1] 11.16863
```

```r
print(p4_root_mean)
```

```
## [1] 24.99697
```