# DeSantis_Matthew_HW_4

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## 3.3.3

### (a)

```
tv = data.frame(Amount = c(0,400,750,800,1150,1500),
                Probability = c(0.49,0.168,0.252,0.0144,0.0432,0.0324))
```

### (b)

```
Amount= c(0,400,750,800,1150,1500)
Probability = c(0.49,0.168,0.252,0.0144,0.0432,0.0324)
expectedamt = sum(Amount*Probability)
varamt = sum((Amount**2)*Probability) - expectedamt**2
expectedamt
```

```
## [1] 366
```

```
varamt
```

```
## [1] 173922
```

## 3.3.7

### (a)

median = sqrt(2), IQR = Q3 - Q1 = sqrt(3) -1

### (b)

```
PDF = function(x){
  return (x/2)
}
PDF.X = function(x){
  return ((x**2)/2)
}
PDF.X2 = function(x){
  return ((x**3)/2)
}
## true for x between 0 and 2
expectedtime = integrate(PDF.X,0,2)
vartime = integrate(PDF.X2,0,2)$value - (expectedtime$value)**2
expectedtime$value
```

```
## [1] 1.333333
```

```
vartime
```

```
## [1] 0.2222222
```

## 3.4.4

### (a)

expected value = 5

variance = 2.5

### (b)

```
dbinom(5,10,0.5)
```

```
## [1] 0.2460938
```

### (c)

```
pbinom(5,10,0.5)
```

```
## [1] 0.6230469
```

### (d)

Y represents the number of questions answered incorrectly

### (e)

```
pbinom(8,10,0.5)-pbinom(4,10,0.5)
```

```
## [1] 0.6123047
```

## 3.4.13

### (b)

Sample space = {0,1,2,3} PMF = dhyper(x, 3, 17, 5) or ((choose(3,x)*choose(17,20-x))/choose(20,5))

### (c)

```
dhyper(1, 3, 17, 5)
```

```
## [1] 0.4605263
```

### (d)

```
expectedfault = (5*3/20)
varfault = expectedfault*(1-3/20)*(15/19)
expectedfault
```

```
## [1] 0.75
```

```
varfault
```

```
## [1] 0.5032895
```

## Additional Problem

MGF of X~U(0,1) = E(exp(tx)) = integral from 0 to 1 of exp(tx) = exp(tx)/t evaluated from 0 to 1 = exp(t)/t - 1/t = (exp(t)-1)/t when t!=0. When t = 0, then MGF = E(exp(x*0)) = E(exp(0)) = 1