Coding Homework 2

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0.1 Expected Value

1a) coin flip

```
x = c(0, 1) # possible values
px = c(0.5, 0.5) # probability of each value

ex <- sum(x * px)
ex
```

```
[1] 0.5
```

1b) Z = the result of a 20-sided die roll

```
z = c(1:20)
pz = rep(1/20, 20)

ez <- sum(z * pz)
ez
```

```
[1] 10.5
```

1c)

```
# for binomial distribution E(Y) = n*p where Y ~ Binom(n, p); Y_1 ~ binom(25,
0.2)
n1 <- 25
p1 <- 0.2

ey1 <- 25 * 0.2
ey1
```

```
[1] 5
```

```
# the probability of getting 5 zener cards (successes) in 25 trials
dbinom(5, size = 25, prob = 0.2)
```

```
[1] 0.1960151
```

1d)

```
# for binomial distribution E(Y) = n*p where Y2 ~ Binom(n, p); Y2 ~ binom(25,
0.9)
```

```r
n1 <- 25
p1 <- 0.9

ey1 <- 25 * 0.9
ey1
```

```
[1] 22.5
```

0.2 Variance

1a) coin flip

```
x = c(0, 1) # possible values
px = c(0.5, 0.5) # probability of each value

ex <- sum(x * px)
ex
```

```
[1] 0.5
```

```
# Variance
sum(px * (x - ex)^2)
```

```
[1] 0.25
```

1b) Z = the result of a 20-sided die roll

```
z = c(1:20)
pz = rep(1/20, 20)

ez <- sum(z * pz)
ez
```

```
[1] 10.5
```

```
# variance
sum(pz * (z - ex)^2)
```

```
[1] 133.25
```

1c & 1d) V[Y] = n * p * (1 - p)

```
n1 <- 25
p1 <- 0.2
p2 <- 0.9


vy1 <- n1 * p1 * (1 - p1)
vy2 <- n1 * p2 * (1 - p2)

vy1
```

```
[1] 4
```

```
vy2
```

```
[1] 2.25
```