# Discussion - Week8

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```
library(matlib)
```

## Example 8.2

Let X be a continuous random variable with values unformly distributed over the interval [0, 20]. (a) Find the mean and variance of X. (b) Calculate P(|X −10| ≥ 2), P(|X −10| ≥ 5), P(|X −10| ≥ 9), and P (|X − 10| ≥ 20) exactly. How do your answers compare with those of Exercise 1? How good is Chebyshev's Inequality in this case?

```
a <- 0
b <- 20

mu <- (b+a) / 2
print(paste0('8.2a) mean = ', mu))
```

```
## [1] "8.2a) mean = 10"
```

```
var  = (b-a)^2 / 12
print(paste0('8.) variance = ', round(var,4)))
```

```
## [1] "8.) variance = 33.3333"
```

```
sd <- sqrt(var)
print(paste0('8.) standard deviation = ', round(sd,4)))
```

```
## [1] "8.) standard deviation = 5.7735"
```

```
d <- mu + 2
c <- mu - 2
p2 <- (d-c) / (b-a)
print(paste0('P(|x-10| >= 2)k >= 2 = ' , round(p2,4) ))
```

```
## [1] "P(|x-10| >= 2)k >= 2 = 0.2"
```

```
d <- mu + 5
c <- mu - 5
p5 <- (d-c) / (b-a)
print(paste0('P(|x-10| >= 5)k >= 5 = ' , round(p5,4) ))
```

```
## [1] "P(|x-10| >= 5)k >= 5 = 0.5"
```

```
d <- mu + 9
c <- mu - 9
p9 <- (d-c) / (b-a)
print(paste0('P(|x-10| >= 9)k >= 9 = ', round(p9,4) ))
```

```
## [1] "P(|x-10| >= 9)k >= 9 = 0.9"
```