# ShanklinHW3

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## 1)

```
vec_01 <- rnorm(10, mean = 0, sd = 1)
vec_1001 <- rnorm(10, mean = 100, sd = 1)
vec_10010 <- rnorm(10, mean = 100, sd = 10)
mean(c(vec_01, vec_1001, vec_10010))
```

```
## [1] 65.13256
```

```
sd(c(vec_01, vec_1001, vec_10010))
```

```
## [1] 47.39068
```

The mean and sd are not the exact same because we are sampling from those disatributions, but we are close since we are taking a sample.

## 2)

```
sample(c("heads", "tails"), 20, p = c(.5,.5), replace =T)
```

```
##  [1] "heads" "heads" "tails" "tails" "heads" "heads" "heads" "heads"
##  [9] "heads" "tails" "tails" "heads" "heads" "heads" "heads" "tails"
## [17] "tails" "tails" "heads" "heads"
```

## 3)

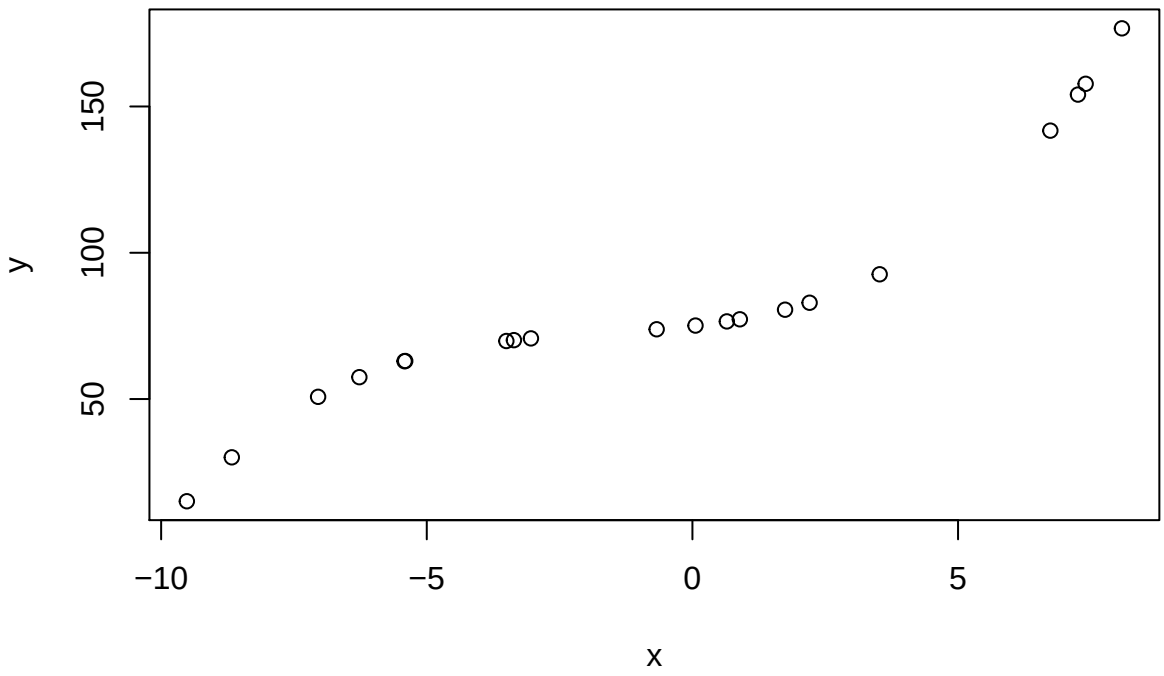
```
set.seed(158)
sample(c("heads", "tails"), 20, p = c(.5,.5), replace =T)
```

```
##  [1] "heads" "heads" "heads" "tails" "tails" "tails" "tails" "heads"
##  [9] "heads" "heads" "tails" "heads" "heads" "heads" "tails" "tails"
## [17] "tails" "tails" "tails" "heads"
```

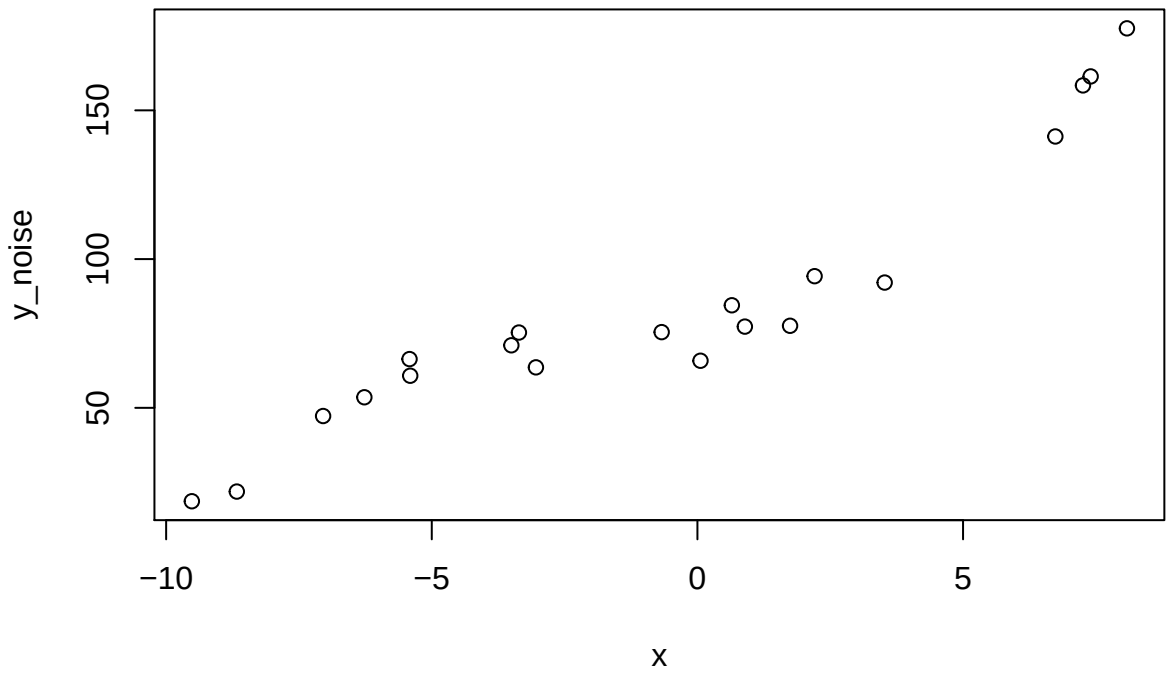
set.seed(158) allows us to repeat the random sample with the exact same output.

## 4)

```
x <- runif(20,-10,10)

y <- 75 + 2*x + 0.5*x^2 + 0.1*x^3

plot(x,y)
```

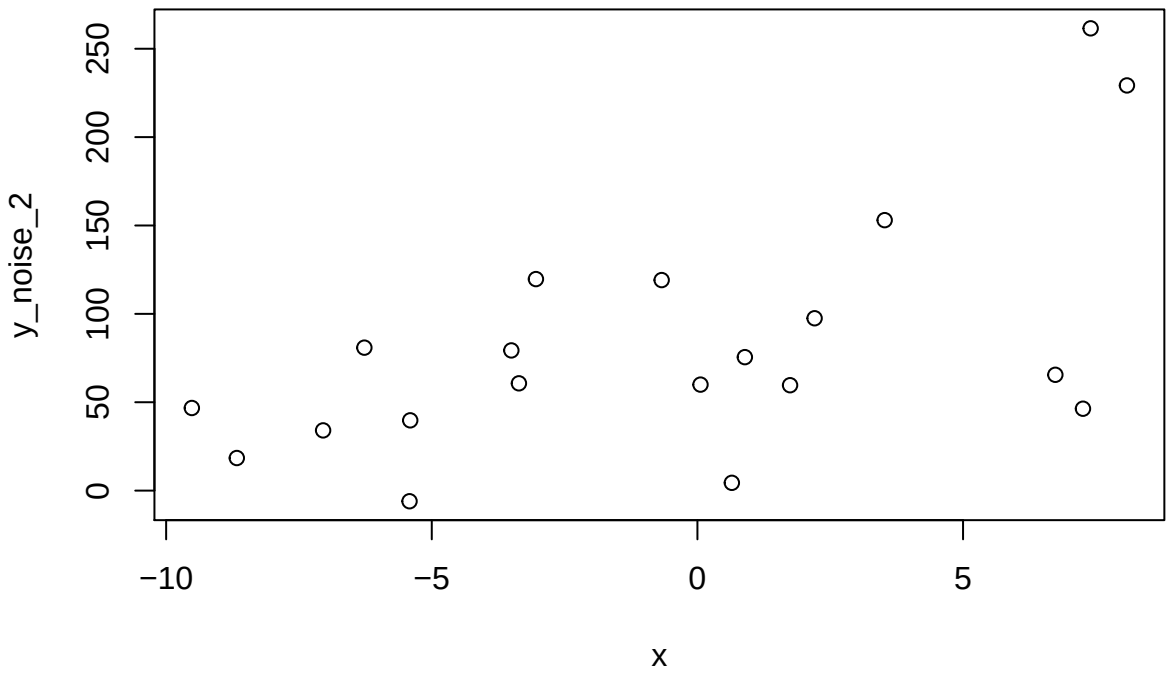



```
noise <- rnorm(20,0,5)

y_noise <- y + noise

plot(x,y_noise)
```




**d) The plot is slightly different, where the scatter plot is not a perfect cubic funtion. There is a slight "noise" in the graph.**

```
noise_2 <- rnorm(20, 0, 50)

y_noise_2 <- y + noise_2

plot(x,y_noise_2)
```




**e) There is a larger change in the graph because we are sampling from a normal with a larger sd, which means more variation in our noise plot.**

```
cbind(y, y_noise, y_noise_2)
```

```
##               y   y_noise  y_noise_2
##  [1,]  80.53999  77.57988  59.628588
##  [2,]  75.11717  65.83273  59.970932
##  [3,]  62.93261  66.38660  -6.013895
##  [4,]  77.25614  77.30686  75.508050
##  [5,]  15.06542  18.60073  46.747510
##  [6,] 176.70914 177.56193 229.242592
##  [7,] 157.74878 161.40443 261.533818
##  [8,]  82.91622  94.25691  97.515530
##  [9,]  70.73210  63.60374 119.678395
## [10,]  76.53350  84.47725   4.406013
## [11,]  73.85007  75.45062 119.109334
## [12,]  70.13173  75.31509  60.692156
## [13,]  69.83264  71.02135  79.319455
## [14,] 154.07122 158.38463  46.336034
## [15,]  50.75431  47.24887  34.069045
## [16,] 141.74951 141.21581  65.518707
## [17,]  57.47462  53.55263  80.877370
## [18,]  92.63961  92.11294 153.009787
## [19,]  63.00383  60.79204  39.758279
## [20,]  30.07230  21.85500  18.432832
```

**f) There seems to be a much larger change in numbers because of the larger variation in the noise. So with more variation, there is a chance to have the noise farther away from "true"" y values.**