Carnival Game

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Building Example Dataset

For this exercise, I am going to create the dataset within R.

```
people <- data.frame("Height" = c(5,9,13,12,10,11,8,9,10,12,11,9,10,12,8,9,10,15,13,11) + 60,
                     "Weight" = c(140,157,205,198,162,174,150,165,170,180,170,
                                  162,165,180,160,155,165,190,185,155))
```

Strategy 1, Guess Average Weight Every Time

```
guess  <-  mean(people$Weight)
```

If we guess the average weight 169.4, how does do we perform? If we are within the 10 pounds $\pm 5 lbs$ we win \$2. Otherwise, we lose \$2.

```
people$Strat_1_Error <- people$Weight - guess

head(people, 5)
```

```
##   Height Weight Strat_1_Error
## 1     65    140         -29.4
## 2     69    157         -12.4
## 3     73    205          35.6
## 4     72    198          28.6
## 5     70    162          -7.4
```

We can see that we created a new column which calculates how far off we were. Now let's see how much we made/loss

```
people$Strat_1_GainLoss <- -2 # creating the default set of losses
people$Strat_1_GainLoss[abs(people$Strat_1_Error) <= 5] <- 2 # finding and replacing all the ones in wh
```

This may seem strange, but computationally speaking, it is much faster than looping through each element.

```
sum(people$Strat_1_GainLoss)
```

```
## [1] -16
```

-16. Not a great day.

Strategy 2 Include height.

```
model <- lm(Weight ~ Height, data = people)

model
```

```
##
## Call:
## lm(formula = Weight ~ Height, data = people)
##
## Coefficients:
## (Intercept)       Height
##    -279.229        6.377
```

Now that we have a relationship between height and weight, we can make more informed predictions.

```
people$Strat_2_Error <- people$Weight - predict(model, newdata = data.frame(Height = people$Height))

people$Strat_2_GainLoss <- -2 # creating the default set of losses
people$Strat_2_GainLoss[abs(people$Strat_2_Error) <= 5] <- 2 # finding and replacing all the ones in wh

head(people, 5)
```

```
##   Height Weight Strat_1_Error Strat_1_GainLoss Strat_2_Error Strat_2_GainLoss
## 1     65    140         -29.4               -2      4.717450                2
## 2     69    157         -12.4               -2     -3.790924                2
## 3     73    205          35.6               -2     18.700702               -2
## 4     72    198          28.6               -2     18.077796               -2
## 5     70    162          -7.4               -2     -5.168017               -2
```

```
sum(people$Strat_2_GainLoss)
```

```
## [1] 12
```

12. Much better result. What other things can we do to get higher winnings?