# Report for Q3 and Q4

Ruixiang JIANG 19079662d

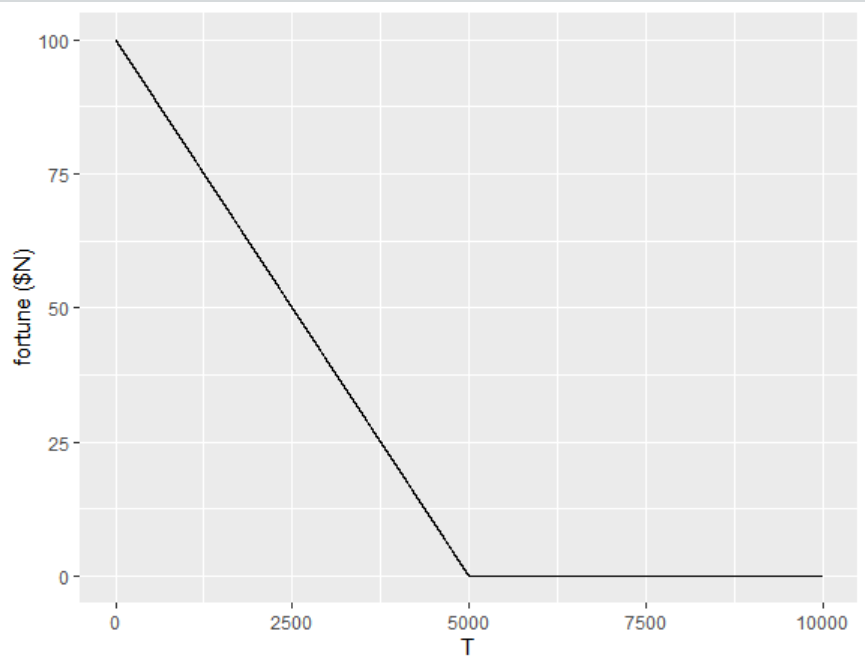
## Q3

### Q3(1)

The probability that he do not run out of money after 100,1,000,10,000 , and 100,000 times are (approximately) 1, 0.99, 0.085, 0 respectively.

(This answer is obtained by Monte Carol Simulation, so may have minor error to the accurate value.)

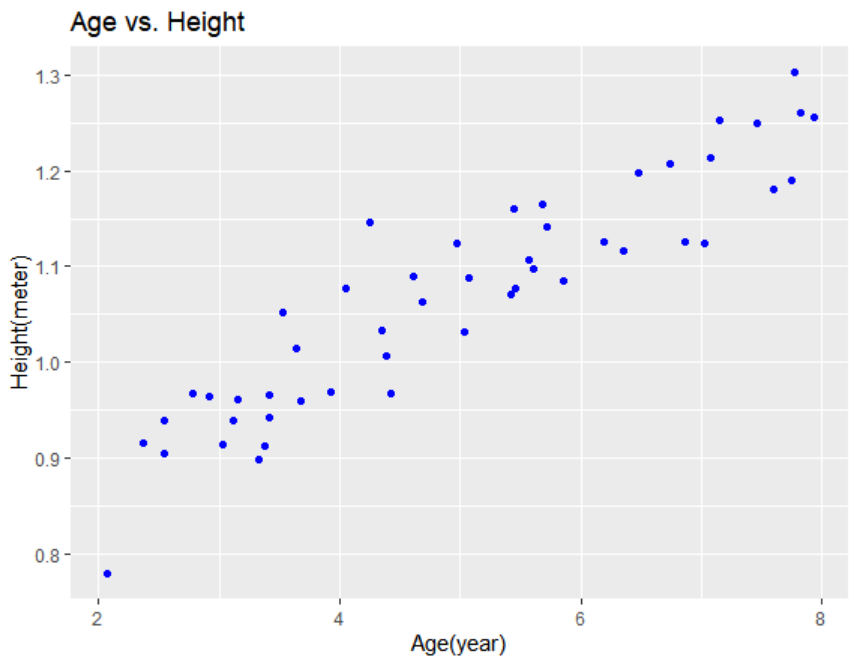
**Q3(2)**



**My observation**: The more he gamble, the less money he will have on average.(i.e. the money he have is a decreasing liner function to the gamble times until he run out of money. He will eventually end up with no money.)

## Q4

### Q4(1)

Our sample looks like this,

to find the linear regression line is to find a line which minimize the sum of errors.

for each point, error .

Sum of error square

To minimize D, we shall use calculus.  
Find the partial derivate of and

let and be 0, and . (I think unbiased estimation is also ok here (as slides shows), anyway it do not affect the result)

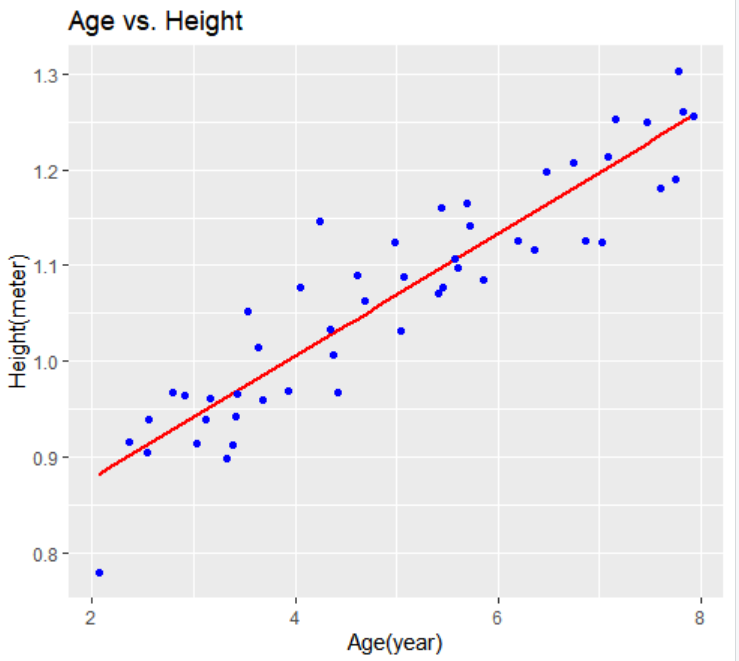
We have:

and

Finally, we can get：

and

### Q4(2)



### Q4(3)

the model we get in Q4(2) is .

To predict height, just simply use this model with different x value.  
So, for a 3.5-yr-old boy, his expected height is meters.  
and for an 8-yr-old boy, it’s meters