Fixed Income Homework 4

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Question 1

The duration can be calculated as e^{-AT}, where A is average rate for a time horizon T. The duration is as below:

1	2	3	4	5
0.9539059	0.9083458	0.8574677	0.8050124	0.7548408

Question 2

Assuming that payoff for the cap at each caplet is the max(interest rate - strike,0) * 100, The mean price of the 5 year interest rate cap is as below:

```
## [1] 5.938161
```

Question 3

Assuming that payoff for the cap at each floorley is the max(strike - interest rate,0) * 100, The mean price of the 5 year interest rate floor is as below:

```
## [1] 4.946658
```

Question 4

The price of the 5 year caplet (assuming payoff is on an amount of 100) is as below:

```
## [1] 0.3851192
```

The price of the 5 year floorlet (assuming payoff is on an amount of 100) is as below

```
## [1] 0.4371507
```

The 5 year Floorlet is more valuable than the 5 year caplet.

Question 5

The price of the 5 year caplet (assuming payoff is on an amount of 100) is as below:

```
## [1] 0.533584
```

The price of the caplet on 5 year average rate (assuming payoff is on an amount of 100) is as below:

```
## [1] 0.08269459
```

So the 5 year caplet is more valuable than the 5 year caplet on average rates.

Question 6

The standard deviation on the 5 year interest rates is as below:

```
## [1] 0.01614621
```

The standard deviation on the average interest rates over 5 year period is as below:

```
## [1] 0.008683157
```

We are more than 99% confident of the price of the 5 year average rate call option, but we can't be 99% sure of the price of the 5 year call option