

Homework 4

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注：因为我不懂 R 语言，所以代码都是用 Python 写的。代码文件见 homework4-code.ipynb

6.3

解：

a. 由题目可得

```
ed.ImportanceSampling_stdnorm(sample_size = 10000)
✓ 0.0s
0.7751669496314346
```

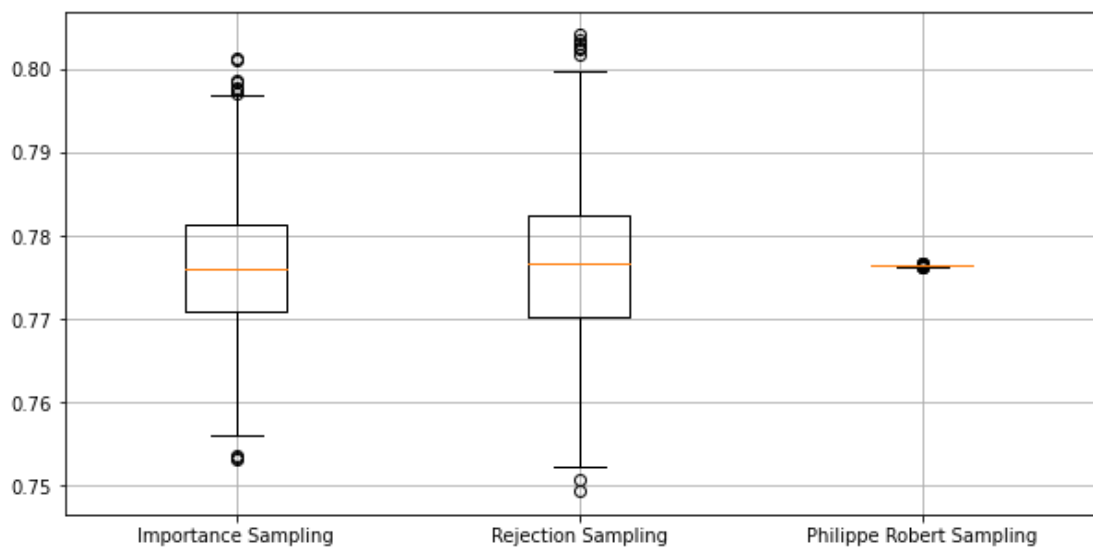
b.

```
ed.RejectionSampling_stdnorm(sample_size = 10000)
✓ 0.0s
0.7720989696323239
```

c.

```
ed.PhilippeRobertMethod_stdnorm(sample_size = 10000)
✓ 0.0s
0.776472331075688
```

d.



可见，这三个方法的 MC 采样方法得到的估计，均值很接近，但前两个的方差比第三个高太多。这其实是因为第三个方法虽说是采样，但其实更像数值

积分。

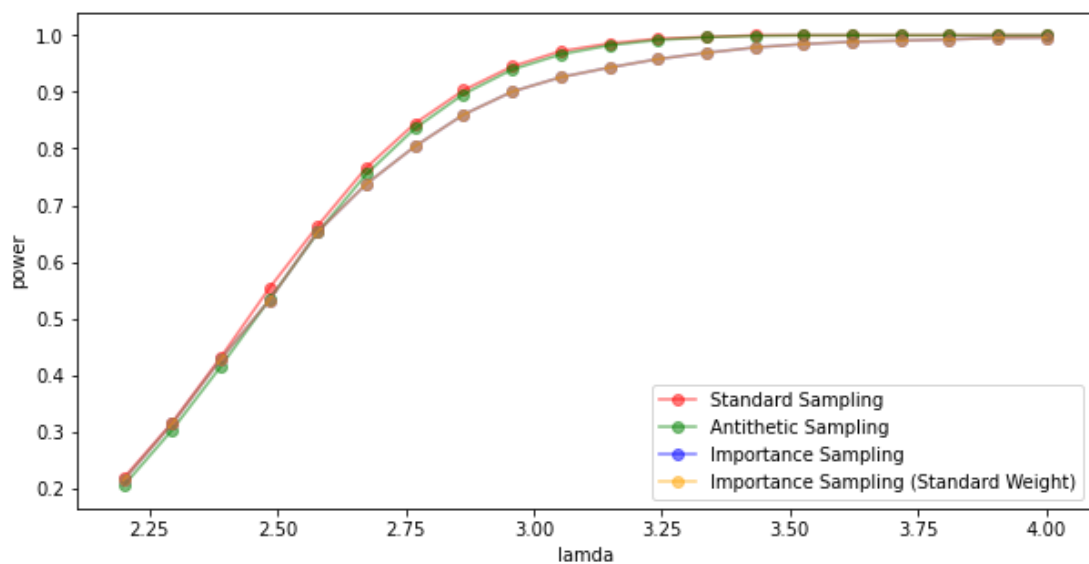
6.6

解：

a.

	Lb	Mean	Ub	Sd
Standard Sampling	0.0410	0.055595	0.070	0.007328
Antithetic Sampling	0.0465	0.055979	0.066	0.005025
Importance Sampling	0.0450	0.059256	0.075	0.007661
Importance Sampling (Standard Weight)	0.0450	0.059256	0.075	0.007661

b.



6.7

解：

a.

```
fair_price = stock.FairPrice(30, option_style = "Europ")
print("The expectation of european fair price is %f"%(fair_price))
```

✓ 3.0s

The expectation of european fair price is 2.101421

b.

```
fair_price = stock.FairPrice(30, option_style = "Asia")
print("The expectation of asian fair price is %f"%(fair_price))
```

✓ 0.9s

The expectation of asian fair price is 0.944598

c.

```
fair_price = stock.FairPrice(30, option_style = "Asia", variate_control = True)
print("The expectation of asian fair price is %f"%(fair_price))
```

✓ 0.9s

The expectation of asian fair price is 0.944633

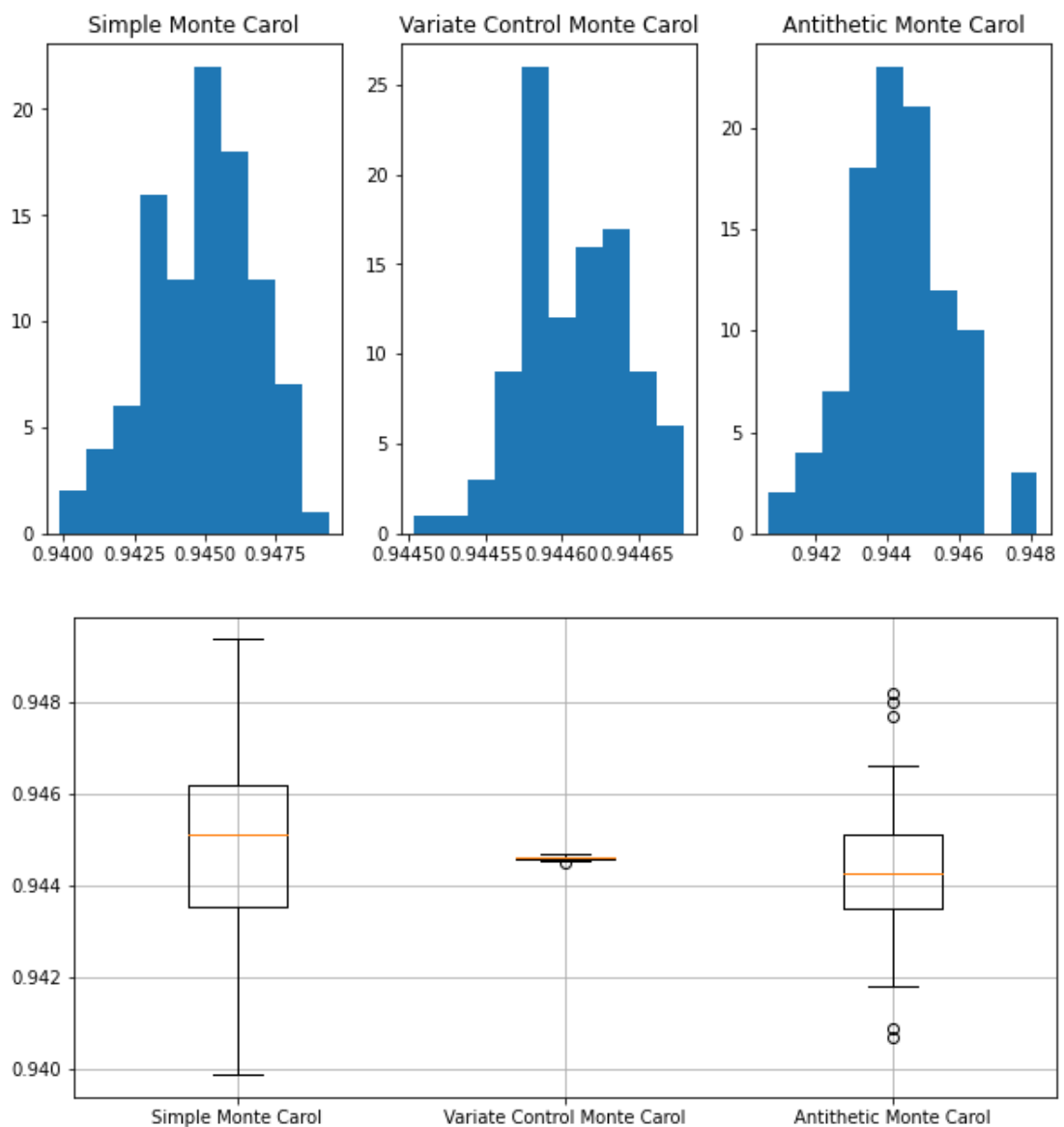
d.

```
fair_price = stock.FairPrice(30, option_style = "Asia", variate_control = False, sample_method = "Antithetic")
print("The expectation of asian fair price is %f"%(fair_price))
```

✓ 3.3s

The expectation of asian fair price is 0.941762

e. D



可见，variate control 方法的方差显著小于另外两个方法。