Financial Risk Management MA477
Quiz

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Ques.3

Code

```
import statistics as st
from scipy.stats import norm

C = []
f1 = open('d-csp0108.txt', 'r')
i = 0
for line in f1:
   if i==0:
       i+=1
       continue
   C.append(float(line[14:23]))
   i+=1

i-=1
print(i)
f1.close()

S = 30000
C.sort()

C_mean = st.mean(C)
C_std = st.stdev(C)

a=0.05
print("Initial investment:", S)
#Non-parametric VaR
print("Confidence : ", 1-a)
var_np = -S*C[int(round(i*a))]
print("Non-parametric VaR for C: ", var_np)
```

```python
#Parametric VaR
var_p = -S*norm.ppf(a, loc=C_mean, scale = C_std)
print("parametric VaR for C: ", var_p)
```

5b) Let $L(x)$ be a slowly varying at infinity and a is the tail index, then if $x_1 > 0$ & $x_2 > 0$, then

$$\frac{P(R < -x_1)}{P(R < -x_2)} = \frac{L(x_1)}{L(x_2)} \left(\frac{x_1}{x_2}\right)^{-a}.$$

If we suppose that $x_1 = VaR(\alpha_1)$ & $x_2 = VaR(\alpha_0)$ ~~there~~ where $0 < \alpha_1 < \alpha_0$,

Then
$$\frac{\alpha_1}{\alpha_0} = \frac{P\{R < -VaR(\alpha_1)\}}{P\{R < -VaR(\alpha_0)\}} = \left(\frac{VaR(\alpha_1)}{VaR(\alpha_0)}\right)^{-a} \left(\frac{L\{VaR(\alpha_1)\}}{L\{VaR(\alpha_0)\}}\right)$$

Because L is slowly varying at infinity and $VaR(\alpha_1)$ & $VaR(\alpha_0)$ are assumed to be reasonably large we make approximation

$$\frac{L\{VaR(\alpha_1)\}}{L\{VaR(\alpha_0)\}} = 1$$

So,
$$\frac{VaR(\alpha_1)}{VaR(\alpha_0)} = \left(\frac{\alpha_0}{\alpha_1}\right)^{1/a}$$

$$VaR(\alpha_1) = VaR(\alpha_0)\left(\frac{\alpha_0}{\alpha_1}\right)^{1/a}.$$

Here, $\alpha_1 = 0.05$. and $\alpha_0 = 0.001$

Ques.4
In the zip