April 21

2) 2 Assuming that returns are i.i.d & normally distributed. For a portfolio scaling over T days:

$$\sigma_T = \sigma_1 \times \sqrt{T}$$

Also $VaR_{T,C} = -\Phi^{-1}(c) \times \sigma_T$

$\Rightarrow$ 98% 5 day VaR $= -\Phi^{-1}(0.98) \times \sqrt{5}\,\sigma_1$ -(i)

99% 10 day VaR $= -\Phi^{-1}(0.99) \times \sqrt{10}\,\sigma_1$ -(ii)

$\Rightarrow$ From (i) & (ii) equating value of σ_1 we get

$$+\frac{99\%\text{ 10 day VaR}}{\Phi^{-1}(0.99)\sqrt{10}} = +\frac{98\%\text{ 5 day VaR}}{\Phi^{-1}(0.98)\sqrt{5}}$$

$$\Rightarrow 99\%\text{ 10 day VaR} = \frac{\Phi^{-1}(0.99)}{\Phi^{-1}(0.98)}\sqrt{\frac{10}{5}} \times 98\%\text{ 5 day VaR}$$

$$= \frac{2.3263}{2.0537}\sqrt{2} \times 10$$

$$= 16.02 \text{ million } \$$$