Math 530

Autumn 2006

Solution to 3.3.20

(a.) Let X be the profit from 100 shares of the same stock.

$$P(X > 8000) = P(X = 10000) + P(X = 20000) = \frac{1}{4} + \frac{1}{4} = \mathbf{\frac{1}{2}}$$

(b.) Let X_i be the profit of stock i and let $S = X_1 + \cdots + X_{100}$. Then

$E(S) = 100E(X_1) = 100(200P(X = 200) + 100P(X = 100) + 0P(X = 0) - 100P(X = -100)) = 100(50) = 5000$

and

$SD(S) = \sqrt{100}SD(X_1) = 10(\sqrt{40000P(X = 200) + 10000P(X = 100) + 0P(X = 0) + 10000P(X = -100) - (50)^2}$

$$SD(S) = 10\sqrt{15000} = 10(111.8034) = 1118.034$$

Therefore

$$P(S > 8000) = 1 - P(S \leq 8000) \approx \Phi\left(\frac{8000 - 5000}{1118.034}\right) = 1 - \Phi(2.68) = 1 - 0.9963 = \mathbf{0.0037}$$