1. Solution: C.

The probability that the performance is at or below the expectation is calculated by finding F(3) = p(3) + p(2) + p(1)+ p(0) using the formula:

$$P(x)=P(X=x)=C_n^x p^x (1-p)^{n-x}=\frac{n!}{(n-x)!x!}p^x (1-p)^{n-x}$$

Using this formula,

$$P(3)=\frac{4!}{(4-3)!3!}0.75^3(1-0.75)^{4-3}=\frac{24}{6}(0.42)(0.25)=0.42$$

$$P(2)=\frac{4!}{(4-2)!2!}0.75^2(1-0.75)^{4-2}=\frac{24}{4}(0.56)(0.06)=0.20$$

$$P(1)=\frac{4!}{(4-1)!1!}0.75^1(1-0.75)^{4-1}=\frac{24}{6}(0.75)(0.02)=0.06$$

$$P(0)=\frac{4!}{(4-0)!0!}0.75^0(1-0.75)^{4-0}=\frac{24}{24}(1)(0.004)=0.004$$

Therefore,

F(3) = p(3) + p(2) + p(1)+ p(0)=0.42+0.20+0.06+0.004=0.684.

Or:

The probability that the performance is at or below the expectation also can be calculated by finding F(3) = 1-p(4) using the formula:

$$P(4)=\frac{4!}{(4-\ 4)!4!}0.75^4(1-0.75)^{4-4}=0.75^4=0.316$$

Therefore,

F(3) =1- p(4)=1-0.316=0.684.

2. Solution: A.

For a standard normal distribution, the probability that a random variable lies within 1 standard of the mean is about 68%.

$$P(\mu-\sigma \le X \le \mu+\sigma)=68\%$$

The probability that a random variable lies within 1.96 standard of the mean is about 95%.

$$P(\mu-2\sigma \le X \le \mu+2\sigma)=95\%$$

The probability that a random variable lies within 1 standard deviation to 2 standard deviation is about 13.5%.

$$P(\sigma \le X \le 2\sigma)=\frac{(95\%-68\%)}{2}=13.5\%$$

3. Solution: B.

Assume the sample size will be large and thus the 95 percent confidence interval for the mean of a sample of manager returns is: $\bar{X} \pm 1.96S_{\bar{X}}$, where $S_{\bar{X}}=\frac{s}{\sqrt{n}}$ **.** Munzi wants the distance between the upper limit and lower limit in the confidence interval to be 1 percent, which is:

$(\bar{X}+1.96S_{\bar{X}}) - (\bar{X} - 1.96S_{\bar{X}}) = 1\%$,

Simplifying this equation, we get $2(1.96S_{\bar{X}})$=1%. Finally, we have 3.92× $S_{\bar{X}}$ = 1%, which gives us the standard deviation of the sample mean, $S_{\bar{X}}$ = 0.255%. The distribution of sample means is $S_{\bar{X}} = \frac{\boldsymbol{S}}{\sqrt{\boldsymbol{n}}}$. Substituting in the values for $S_{\bar{X}}$ and S, we have $0.225\% = \frac{4\%}{\sqrt{n}}$or $\sqrt{n}$= 15.69. Squaring this value, we get a random sample of n = 246.

4. Solution: A.

With her budget, Munzi can pay for a sample of up to 100 observations, which is far short of the 246 observations needed. Munzi can either proceed with her current budget and settle for a wider confidence interval or she can raise her budget (to around $2,460) to get the sample size for a 1 percent width in her confidence interval.

5. Solution: C.

C is correct. Stratified random sampling involves dividing a population into subpopulations based on one or more classification criteria. Then, simple random samples are drawn from each subpopulation in sizes proportional to the relative size of each subpopulation. These samples are then pooled to form a stratified random sample.