Question #210
Key: C

Consider Disease 1 and other Diseases as independent Poisson processes with respective $\lambda's = (0.16)\left(\frac{1}{16}\right) = 0.01$ and $(0.16)\left(\frac{15}{16}\right) = 0.15$ respectively. Let $S_1 =$ aggregate losses from Disease 1; S_2 = aggregate losses from other diseases.

$$E(S_1) = 100 \times 0.01 \times 5 = 5$$
$$Var(S_1) = 100 \times 0.01 \times \left(50^2 + 5^2\right) = 2525$$
$$E(S_2) = 100 \times 0.15 \times 10 = 150$$
$$Var(S_2) = 100 \times 0.15 \times \left(20^2 + 10^2\right) = 7500$$

If no one gets the vaccine:

$$E(S) = 5 + 150 = 155$$
$$Var(S) = 2525 + 7500 = 10,025$$
$$\Phi(0.7) = 1 - 0.24$$
$$A = 155 + 0.7\sqrt{10,025} = 225.08$$

If all get the vaccine, vaccine cost = $(100)(0.15) = 15$
No cost or variance from Disease 1

$$B = 15 + 150 + 0.7\sqrt{7500} = 225.62$$
$$A/B = 0.998$$