

Question #106

Key: B

N = number of salmon

X = eggs from one salmon

S = total eggs.

$$E(N) = 100t$$

$$Var(N) = 900t$$

$$E(S) = E(N)E(X) = 500t$$

$$Var(S) = E(N)Var(X) + E^2(X)Var(N) = 100t \cdot 5 + 25 \cdot 900t = 23,000t$$

$$P(S > 10,000) = P\left(\frac{S - 500t}{\sqrt{23,000t}} > \frac{10,000 - 500t}{\sqrt{23,000t}}\right) = .95 \Rightarrow$$

$$10,000 - 500t = -1.645 \cdot \sqrt{23,000} \sqrt{t} = -250\sqrt{t}$$

$$40 - 2t = -\sqrt{t}$$

$$2(\sqrt{t})^2 - \sqrt{t} - 40 = 0$$

$$\sqrt{t} = \frac{1 \pm \sqrt{1 + 320}}{4} = 4.73$$

$$t = 22.4$$

round up to 23