

## Question #256

Key: B

$$L(q) = \left[ \binom{2}{0} (1-q)^2 \right]^{5000} \left[ \binom{2}{1} q(1-q) \right]^{5000} = 2^{5000} q^{5000} (1-q)^{15000}$$

$$l(q) = 5000 \ln(2) + 5000 \ln(q) + 15000 \ln(1-q)$$

$$l'(q) = 5000q^{-1} - 15000(1-q)^{-1} = 0$$

$$\hat{q} = 0.25$$

$$l(0.25) = 5000 \ln(2) + 5000 \ln(0.25) + 15000 \ln(0.75) = -7780.97.$$