

## Question #229

Key: A

$$\ln f(x) = \ln \theta - 2 \ln(\theta + x)$$

$$\frac{\partial \ln f(x)}{\partial \theta} = \frac{1}{\theta} - \frac{2}{\theta + x}$$

$$\frac{\partial^2 \ln f(x)}{\partial \theta^2} = -\frac{1}{\theta^2} + \frac{2}{(\theta + x)^2}$$

$$E \left[ \frac{\partial^2 \ln f(x)}{\partial \theta^2} \right] = -\frac{1}{\theta^2} + \int_0^{\infty} \frac{2\theta}{(\theta + x)^4} dx = -\frac{1}{\theta^2} + \left[ -\frac{2\theta}{3(\theta + x)^3} \right]_0^{\infty} = -\frac{1}{\theta^2} + \frac{2}{3\theta^2} = -\frac{1}{3\theta^2}$$

$$I(\theta) = \frac{n}{3\theta^2}; \quad \text{Var} = \frac{3\theta^2}{n}$$