Math 152 – Fall 2007
Professor Hardin
warm-up # 10

Name: _____

$$\begin{aligned}
\text{we know } f(\underline{x}|\theta) &= \prod_{i=1}^{n} f(x_i|\theta) \\
\text{let } \lambda(\underline{x}|\theta) &= \ln \prod_{i=1}^{n} f(x_i|\theta) \\
&= \sum_{i=1}^{n} \ln f(x_i|\theta) \\
\text{let } I_n(\theta) &= -E[\lambda''(\underline{X}|\theta)] \text{ for } X_1, X_2, \ldots X_n \text{ iid} \\
\text{show } I_n(\theta) &= nI(\theta)
\end{aligned}$$

Solution

$$\begin{aligned}
\lambda(\underline{x}|\theta) &= \sum_i \lambda(x_i|\theta) \\
\lambda'(\underline{x}|\theta) &= \sum_i \lambda'(x_i|\theta) \\
\lambda''(\underline{x}|\theta) &= \sum_i \lambda''(x_i|\theta) \\
I_n(\theta) &= -E[\lambda''(\underline{X}|\theta)] \\
&= -E[\sum_i \lambda''(X_i|\theta)] \\
&= -\sum_i E[\lambda''(X_i|\theta)] \\
&= nI(\theta)
\end{aligned}$$