1. Exercise E.5.1 from Datta's book. Go also through the simple-minded derivation of the weak-localization correction to the conductivity in 2 dimensions (pages 207-208):

$$\sigma = \sigma_{\rm cl} - \frac{e^2}{\pi h} \ln \frac{\tau_\phi}{\tau_m}.$$

Use a similar argument to derive in 3 dimensions the following result

$$\sigma = \sigma_{\rm cl} - \frac{e^2}{2\pi h}(\frac{1}{L_m} - \frac{1}{L_\phi}),$$

which probably is correct at least qualitatively. (There is an additional correction arising from electron-electron interactions, which will not be considered here.) Express the relative magnitudes of the weak localization corrections $[(\sigma_{\rm cl} - \sigma)/\sigma_{\rm cl}]$ as a function of $k_F L_m$ in both 2 and 3 dimensions, and compare their order of magnitude.

Exercises E.5.2 and E.5.3 from Datta's book.