Exercise 1

Show that the point $z = 0$ is a simple pole of the function

$$f(z) = \csc z = \frac{1}{\sin z}$$

and that the residue there is unity by appealing to

(a) Theorem 2 in Sec. 76;

(b) the Laurent series for $\csc z$ that was found in Exercise 2, Sec. 67.