Wednesday, 8 March 2023
10 points total.

Name: _____

UID: _____

1. (10 points) What is the region of convergence of the $\mathcal{Z}$-transform of the sequence $x[n] = \delta[n]$?
   Hint: Recall that the $\mathcal{Z}$-transform of a sequence $x[n]$ is defined as $X(z) = \sum_{n=-\infty}^{\infty} x[n]z^{-n}$.

   A. Within the unit circle.

   B. Just the unit circle.

   C. The entire z-plane.

   D. Outside of the unit circle.

Solution:

$$X(z) = \sum_{n=-\infty}^{\infty} \delta[n]z^{-n} = z^{-0} = 1 \tag{1}$$

The answer is (C.), since the corresponding region of convergence for this $\mathcal{Z}$-transform is the entire z-plane.