Discrete Assignment
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PROBLEM STATEMENT(11.9.1 8th question) :Find the 7th term of the sequence where nth term of the sequence is given by $a_n = \frac{n^2}{2^n}$
ANSWER:
Consider the sequence a_n defined as:

$$a_n = \frac{n^2}{2^n}$$

Now, let's find the seventh term (a_7):

$$a_7 = \frac{7^2}{2^7}$$

Calculating this expression gives:

$$a_7 = \frac{49}{128}$$

Therefore, the seventh term (a_7) is $\frac{49}{128}$.

Table 1: Parameters Table

Parameter	**Value**
a_n	$\frac{n^2}{2^n}$
a_7	$\frac{49}{128}$

The Z-transform of the sequence $a_n = \frac{n^2}{2^n}$ is given by:

$$X(z) = \sum_{n=0}^{\infty} a_n z^{-n}$$

Substitute $a_n = \frac{n^2}{2^n}$ into the formula:

$$X(z) = \sum_{n=0}^{\infty} \frac{n^2}{2^n} z^{-n}$$

To find $X(z)$ for the seventh term (a_7), substitute $n = 7$:

$$X(z) = \frac{7^2}{2^7} z^{-7}$$

Therefore, the Z-transform of the seventh term (a_7) is:

$$X(z) = \frac{49}{128} z^{-7}$$

The Region of Convergence (ROC) for a Z-transform expression is the set of values for which the series converges. For the Z-transform $X(z) = \frac{49}{128}z^{-7}$, the ROC is the set of complex values z for which the series converges.

In this case, the Z-transform term z^{-7} indicates that the ROC includes all values of z except possibly 0, as $z = 0$ would result in division by zero.

So, the ROC for $X(z) = \frac{49}{128}z^{-7}$ is the entire complex plane excluding 0.

Please note that the exact determination of the ROC often depends on the entire Z-transform expression and the convergence properties of the series. For simple terms like z^{-7}, the ROC is often the entire complex plane excluding 0.