

1. Let the mappings f and g be given as

$$f = \{\langle 1, 3 \rangle, \langle 2, 2 \rangle, \langle 3, 1 \rangle, \langle 4, 4 \rangle\}$$

$$g = \{\langle 1, 2 \rangle, \langle 2, 2 \rangle, \langle 3, 4 \rangle, \langle 4, 1 \rangle\}.$$

Determine (if possible) $\text{Ran } f$, $\text{Dom } f$, $\text{Ran } g$, $\text{Dom } g$, $g \circ f$, $f \circ g$, f^{-1} , g^{-1} .

2. Compute the following limit of sequence

$$\lim \frac{\sqrt{n^2 + 4n} - n}{5}.$$

3. Compute (without using the l'Hospital rule)

$$\lim_{x \rightarrow 0} x \cot(3x).$$

4. Compute

$$\left(\frac{x \sin x}{\sqrt{x^2 + 4x + 6}} \right)'.$$