

- ① GIVE AN EXAMPLE OF A FUNCTION $f: \mathbb{R} \rightarrow \mathbb{R}$ WHICH IS
- CONTINUOUS AND INCREASING BUT NOT ONTO,
 - ONTO BUT NOT 1-1.
- ② GIVE AN EXAMPLE OF A FUNCTION $f: \mathbb{N} \rightarrow \mathbb{N}$ WHICH IS
- ONTO BUT NOT 1-1.
 - 1-1 BUT NOT ONTO.
- ③ DEFINE $f: \mathbb{R} \rightarrow \mathbb{R}$ BY $f(x) = \begin{cases} \frac{1}{2-x}, & \text{IF } x < 2 \\ 4-x^2, & \text{IF } x \geq 2. \end{cases}$
- SHOW THAT f IS BIJECTIVE.
 - FIND $f^{-1}(y)$.
- ④ DEFINE $f: \mathbb{R} - \{2\} \rightarrow \mathbb{R} - \{5\}$ BY $f(x) = \frac{5x+1}{x-2}$.
- SHOW THAT f IS BIJECTIVE.
- ⑤ DEFINE $f: \mathbb{R} \rightarrow \mathbb{R}$ BY $f(x) = \begin{cases} \frac{1}{x-1}, & \text{IF } x < 1 \\ 8x-x^2, & \text{IF } x \geq 1. \end{cases}$
- SHOW THAT f IS NEITHER 1-1 NOR ONTO.
- ⑥ LET $f: A \rightarrow B$, $g: B \rightarrow C$, AND $h: B \rightarrow C$.
- PROVE OR DISPROVE THE FOLLOWING:
- IF $g \circ f = h \circ f$ AND f IS SURJECTIVE, THEN $g = h$.
- ⑦ LET $f: A \rightarrow B$ AND LET $C = \text{Rng}(f)$.
- IF $g: C \rightarrow A$ AND $g \circ f = I_A$, PROVE THAT $g = f^{-1}$.
- ⑧ DEFINE $f: \mathbb{R} \rightarrow \mathbb{R}$ BY $f(x) = x^3 - 3x^2 + x + 9$.
- SHOW THAT f IS A BIJECTION.