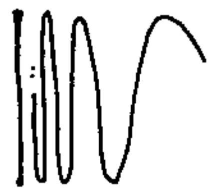
5. (10 points) Mark true (T) or false (F):

a) For any set $A \subset \mathbb{R}^1$ either A or its complement A^C is open.

b) Both of the sets $(0, 2)$ and $(1, 2]$ are open in $X = [0, 2] \subset \mathbb{R}^1$.

c) The map $f: \mathbb{R}^1 - \{0\} \to \mathbb{R}^1 - \{0\}$ given by the formula $f(x) = \frac{1}{x}$ is a homeomorphism.

d) The interval $[0, 1]$ is homeomorphic to the "topologist's sine curve"



e) There is no continuous map from $X = \mathbb{R}^2$ onto $Y = [0, 1] \cup [2, 3]$.

a) False:

Let $A = [0,1) \subset \mathbb{R}^1$. Then $A^c = (-\infty, 0) \cup [1, \infty)$.

b) True:

$(0,2) = (0,2) \cap X$ and open balls around 2 look like $(r, 2]$.

c) True: $f(x) = \frac{1}{x}$ and $f^{-1}(x) = \frac{1}{x}$ are both continuous for $x \neq 0$.

d) False: $[0,1]$ is path connected and the topolgist's sine curve is not.

e) True: Since X is connected and Y is not.