

EXERCISES IN LOGICAL STATEMENTS

Explain which of the conclusions below are true based on the following definition:

Statement A:

A function f is strictly increasing if and only if $f(x) < f(y)$ whenever $x < y$, for any two real numbers x and y .

1. The function x^2 is strictly increasing.
2. If $f(x) < f(y)$ for any two x, y , then f is strictly increasing.
3. If $f(x) < f(y)$ for all x whenever $x < y$ then it is strictly increasing.

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4. If for any two real numbers x and y , if $x < y$ then $f(x) < f(y)$ then f is strictly increasing.
5. If $f(x) < f(y)$ whenever $y > x$ for a given x then f is strictly increasing.

Statement B: (from IRS instructions for tax returns)

If your filing status is single and you are under 65 then you must file a return if your gross income (income before deductions) was at least \$15,750.

1. You are 25 and single. Your total salary was 20,000 and after deductions you took home 15,000. So you don't need to file a return.

2. John was either 24 years old or he was married but not both. But his gross income was over 15,750. So he must have filed a return.

3. If Kim was 20 and single, then she didn't make more than 15,000. So she must not have filed a return.

4. Brian was 40, single, and owned a house, and his gross income was 14000. So he doesn't have to file a return.

Problem 2: Which of the following are paradoxes?

1. I never tell the truth

2. (Groucho Marx) I don't want to be part of any club that would have me as a member.

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Explain the fallacy or inadequacy in the following statements.

1. The rate of new autism cases increased at the same time as vaccination rates increased. Therefore vaccines cause autism.

2. If a team scores a lot of points quickly, they will win. Golden state has lots of good 3 point shooters. Therefore they will win.

Write the negative of the following statements:

1. Seven is prime or five is even.

2. If it rains today the roof will leak.

3. Roses are red and Violets are blue.