

# Math 2013 - Introduction to Discrete Mathematics

Quiz #2 - 2005.08.29

Solutions

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Determine the truth values of the following propositions, where  $P(x, y) = x^2 + y^2 < 1$ . Here, we will assume  $x$  and  $y$  are real numbers.

1.  $(\exists x)(\forall y)P(x, y)$

This is false, as if  $y \geq 1$ , then  $x^2 + y^2 \geq 1$  for  $\forall x$ .

2.  $(\forall y)(\exists x)P(x, y)$

This is false once again, since if  $|y| > 1$ , then there is no  $x$  which satisfies this.

3.  $(\exists y)(\exists x)P(x, y)$

This is true, since one can find a value of  $x$  and a value of  $y$  such that the inequality holds. As an example, consider  $x = y = 0$ .