Quiz: Prep 3 quiz

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① This is a preview of the published version of the quiz

Started: Jan 16 at 9:29am

Quiz Instructions

Readings

Please read the following part of the <u>Course Notes (https://www.teach.cs.toronto.edu/~csc165h/winter/resources/csc165_notes.pdf)</u>:

- Chapter 1, pp. 20-31 (this should be review)
- Chapter 2, pp. 33–40 (this introduces the basic idea of proofs, with some simple examples and then a focus on writing a good *proof header*)

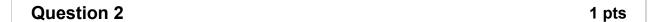
General instructions

You can review the general instructions for all prep quizzes at this-page (https://www.teach.cs.toronto.edu /~csc165h/winter/homework/index.html). Remember that you can submit multiple times! We have posted a PDF version of the quiz on the course website. You might consider printing this quiz out so that you can work on paper first.

Question 1	1 pts
True or False: We will use the following precedence levels, in decreasing order of precedence:	
1. ¬	
2. A, V	
3. ⇒,⇔	
4. ∀,∃	
○ True	
False	

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Review the definition of *divisibility* from lecture, and recall that we can define the predicate $d \mid n$ to mean "d divides n". Using this definition, select all of the **True** statements below.

- $\ \ \Box \ \ \forall n \in \mathbb{Z}, \exists m \in \mathbb{Z}, \ n \mid m$
- $\square \ \forall n \in \mathbb{Z}, \ -1 \mid n$
- $\Box \ \forall n \in \mathbb{Z}, \ n \mid 0$
- $\square \ \forall n,m \in \mathbb{Z},\ n \mid m$
- $\Box \forall n \in \mathbb{Z}, \ 0 \mid n$
- $\Box \exists n \in \mathbb{Z}, \ 0 \mid n$
- $\square \ \exists m \in \mathbb{Z}, \forall n \in \mathbb{Z}, n \mid m$

Question 3 1 pts

Review the negation rules on page 25 of the Course Notes. Then, select the correct negation of this statement:

 $orall x \in \mathbb{R}, \; igl(\exists y \in \mathbb{R}, P(y) \land Q(x,y)igr) \Rightarrow x > 5$

- $\quad \ \ \, \ominus \ \, \forall x \in \mathbb{R}, \, \left(\forall y \in \mathbb{R}, \, \neg P(y) \lor \neg Q(x,y) \right) \Rightarrow x \leq 5$
- $\quad \bigcirc \ \exists x \in \mathbb{R}, ig(\exists y \in \mathbb{R}, P(y) \land Q(x,y)ig) \land x \leq 5$

Question 4 1 pts

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True or False: The following propositional formula is a tautology. $\lnot (p \land q) \lor q$	
TrueFalse	

Suppose we want to **prove** the statement $\exists k \in \mathbb{N}, \ P(k)$ (assume that we've previously defined a predicate P).

Which of the following sentences could we use to introduce k in our proof header?

Let k = 165.

Let k = 1.

Let k = 1.

Question 6 1 pts

Suppose we want to **prove** the statement $\forall x, y \in \mathbb{R}, \ P(x, y)$ (assume that we've previously defined a predicate P).

Which of the following statements could we use to introduce x and y in our proof header?

 \Box Let x be an arbitrary real number, and let y = x + 1.

$_{\square}$ Let $x,y\in\mathbb{R}$.	
\square Let $x=1$ and $y=3$	
\square Let $oldsymbol{x}$ and $oldsymbol{y}$ be arbitra	ry real numbers.

Question 7 1 pts

Suppose we have a proof with the following proof header:

Let x be an arbitrary natural number. Assume that x is greater than 3 and that x is even (i.e., that 2 divides x). We will now prove that Q(x) is true.

[...proof body omitted...]

What is the statement being proven?

- $\circ \ \ \forall x \in \mathbb{N}, \ x > 3 \wedge 2 \mid x \Rightarrow Q(x)$
- $\quad \bigcirc \quad \forall x \in \mathbb{N}, x > 3 \wedge 2 \mid x \wedge Q(x)$
- O(Q(x))
- $\ \, \ominus x \in \mathbb{N}, x > 3 \wedge 2 \mid x \wedge Q(x)$

Question 8 1 pts

Suppose we want to prove the statement $\forall x \in \mathbb{N}, \ P(x) \Rightarrow Q(x+1)$.

Select the assumption we should make in our proof header (after we've introduced the variable x).

- O Assume that P(x) is true.
- O Assume that Q(x+1) is true.

0	Assume that for all $x\in\mathbb{N}$, $P(x)$ is true.
0	Assume that $P(0)$ is true.
0	We should not make any assumptions in our proof header.

Not saved

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