CS 173, Fall 2011, Quiz 2
Solutions

1. (1 point) Give the day and time when your assigned discussion section meets. Check here if you have switched sections since the start of classes.

Solution: We’ll check your answers against the official registrations.

2. (3 points) Give the values of the following, where $p$ is an integer.

\[ \lceil -7.12 \rceil + \lfloor 7 \rfloor = \text{Solution} \quad -7 + 7 = 0 \]

\[ \lfloor p - 0.3 \rfloor = \text{Solution:} \quad p - 1 \quad (\text{since } p \text{ is an integer}) \]

The hypothesis of “If the sky is green, then pigs can fly” is

Solution: the sky is green

3. (6 points) Circle the appropriate label for each of the following statements.

\begin{align*}
x \text{ is positive} & \quad \text{True} \quad \text{False} \quad \text{Neither} \\
3 \mid 0 & \quad \boxed{\text{True}} \quad \text{False} \quad \text{Neither} \\
\text{If } 6 \leq 0, \text{ then } \sqrt{2} > 10. & \quad \boxed{\text{True}} \quad \text{False} \quad \text{Neither} \\
\neg (p \lor q) \equiv (\neg p) \lor (\neg q) & \quad \text{True} \quad \boxed{\text{False}} \quad \text{Neither} \\
1 \text{ is prime} & \quad \text{True} \quad \boxed{\text{False}} \quad \text{Neither} \\
\sum_{k=1}^{n-1} k & \quad \frac{n^2}{2} \quad \frac{n(n+1)}{2} \quad \boxed{\frac{n(n-1)}{2}}
\end{align*}
4. (3 points) Complete the following definition using precise mathematical English and/or notation. Do not use division, mod, remainder, or similar operations.

If $s$ and $t$ are integers, then $s$ is a multiple of $t$ if and only if ...

Solution: $s = tk$ for some integer $k$

5. (3 points) State the negation of the following statement, using logical equivalences to put it into a form where each “not” is on an individual (non-complex) predicate. Give your answer in words (not logical shorthand).

For all martians Abga and Zama, if Abga and Zama are friends, then either Abga is over 18 or Zama is hairless.

Solution: There are martians Abga and Zama, such that Abga and Zama are friends, but Abga is 18 or younger and Zama is not hairless.

6. (4 points) Using the fact that $\sum_{k=2}^{n} k2^k = (n - 1)2^{n+1}$, give a closed-form expression for the following summation. Show your work.

$$\sum_{p=3}^{n+1} (7n + p2^p) =$$

Solution:

$$= \sum_{p=3}^{n+1} 7n + \sum_{p=3}^{n+1} p2^p = 7n(n - 1) + \sum_{p=2}^{n+1} p2^p - 2 \cdot 2^2$$

$$= 7n(n - 1) + n2^{n+2} - 8$$