MATH 3310

Grading Rubric for Homework Assignment #2: Parsimonious logical system; *6 people at a party implies some troika are mutual acquaintances or strangers*; some Number Theory stuff.

Author:

1. Proving or disproving $\{\mathcal{M}, \Phi, \neg, \wedge, \vee, \implies\}$ can be reduced to $\{\mathcal{M}, \Phi, \nabla\}$.

- Author attempts to convert usual operations into ∇ — 0 1 (2)
- Author successfully translates $\neg$ into ∇ (P∇P) — 0 1 (2)
- Author successfully translates $\vee$ into ∇ (probably (P∇Q)∇(P∇Q)) — 0 1 (2)
- Author translates $\wedge$ (probably (P∇P)∇(Q∇Q)) — 0 1 (2)
- Author translates $\implies$ (probably ((P∇P)∇Q)∇((P∇P)∇Q)) — 0 1 (2)
- Author claims the system cannot be reduced AND gives a counterexample — 0 1 2
- Readability
  - Truth tables are not simply displayed — 0 (1) 2
  - Author notes how to interpret the truth tables — 0 1 (2)
- Fluency — 0 1 (2)

2. Proving there's always a monochrome triangle when 6 points are completely connected by lines randomly colored red and blue. Equivalently: there's always a winner in the red/blue triangle-finding game.

- Author makes an attempt — 0 1 (2)
- Author reduces cases to considering one point and the 5 lines incident to it — 0 1 (2)
- Author's argument is convincing — 0 1 (2)
- Readability (If drawings or figures are used, Author explains them) — 0 1 (2)
- Fluency — 0 1 (2)

3. Prime machine?[1]

- Author claims $n^2 + n + 41$ is not a prime machine — 0 1 (2)
- Author provides a counterexample ... — 0 1 (2)
- ... with sufficient detail — 0 1 (2)
- Readability — 0 1 (2)
- Fluency — 0 1 (2)

4. Proving if $9 \mid \sum d_i$, then $9 \mid d_1 d_2 \cdots d_n$.

- Author correctly uses the definition of divisor — (0) 1 2
- Author's tactic is legit and cogent (doesn't 'divide', not example-based, not circular[2]) — 0 1 (2)
- Author uses $a \mid b \wedge a \mid c \implies a \mid (b + c)$ or some other relationship correctly[3] — 0 1 (2)
- Readability — *The last bit of the argument isn't super clear.* — 0 (1) 2
- Fluency — *Great job overall though!* — 0 1 (2)

Subtotal X = __42__/46; Scale: $\lceil X \times \frac{30}{42} \rceil$ = __30__/30

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[1] If Author claims $n^2 + n + 41$ *is* a prime machine, assess Readability and give 1 point for Fluency *only if* a proof is attempted; 0 for Fluency otherwise.

[2] "Never assume what you are trying to prove unless you are trying to prove you're an idiot" — Trevor Williams, former student.

[3] The point to assess is whether they make any unproved statements of fact such as "Since $a \mid (b + c)$, $a \mid b$".