Quiz 2, Discrete Math (15 points, 20 minutes), Fall 2016

Show your work and justify your answers where appropriate. If you write the correct answer without sufficient work or justification, you will receive little or no credit.

1. (3 points) Determine the truth value of

$$\big[p \wedge \big(q \to ((\neg r) \wedge s)\big)\big] \iff (r \wedge t),$$

where p, q, r, s, and t are all true. Briefly justify your answer.

2. (1 point each) Clearly circle your answer (no justification needed here, and no partial credit given).

   (a) If A is a set, then $A \in \mathcal{P}(A)$. TRUE FALSE

   (b) If A and B are sets and $A \subseteq B$, then $A \times A \subseteq A \times B$. TRUE FALSE

   (c) If A, B, and C are sets, then $A \cup (B \cap C) = (A \cap B) \cup (A \cap C)$. TRUE FALSE

3. (3 points) Is there a set x such that $x \subseteq \{x\}$? If your answer is yes, write such an x and justify why it satisfies the property. If your answer is no, justify why there is no such x.

4. (6 points) Prove that if A, B, and C are sets, then $A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$.