Name: _____

Directions: Solve the following problems. Give supporting work/justification where appropriate.

1. Prove the following using a direct proof.

   (a) **[4 points]** Let $a, b \in \mathbb{Z}$. We have that $a + b$ is even if and only if $a - b$ is even.

   (b) **[3 points]** Let $x \in \mathbb{R}$. If $x \neq 1$, then $x < \frac{x^2+1}{2}$.

(c) **[3 points]** Let $a \in \mathbb{Z}$. If $5 \mid 8a$, then $5 \mid a$. (Hint: the equation $a = 16a - 15a$ may be useful.)