Name: _____

1. [**2.5 points**] Verify the correctness of the following program.

$$\begin{array}{|l|}\hline \{\} \\ \quad y = x - 1 \\ \quad y = y * x \\ \{y = x(x - 1)\} \\ \hline \end{array}$$

2. [**2.5 points**] Prove that the sum of two odd integers is even.

3. [**2.5 points**] Prove that $x(x+1)$ is even for every integer x.

4. [**2.5 points**] Using the provided lemma, prove that $\sqrt{2}$ is not a rational number.

   Lemma 1. *The product xy is odd if and only if x is odd and y is odd.*