Due date: Nov 24th in class.

1. (3 points) Let Copy denote the following program:

   a := x;
   y := 0;
   while (a != 0) do {
       y := y + 1;
       a := a - 1;
   }

   (a) Show that ⊢ \text{par} \{ x \geq 0 \} \text{Copy} \{ x = y \}
   (b) Show that ⊢ \text{tot} \{ x \geq 0 \} \text{Copy} \{ x = y \}

2. (3 points) Let Mult denote the following program:

   z := 0;
   while (y ! = 0) do {
       z := z + x;
       y := y - 1;
   }

   (a) Show that ⊢ \text{par} \{ y = y_0 \land y \geq 0 \} \text{Mult} \{ z = x \cdot y_0 \}
   (b) Show that ⊢ \text{tot} \{ y = y_0 \land y \geq 0 \} \text{Mult} \{ z = x \cdot y_0 \}