4. In class we showed that \( H(x, x) \) is undecidable, that is there is no program that for all \( x \) can output \( \text{TRUE} \) if program \( P_x \) halts on input \( x \) and outputs \( \text{FALSE} \) if program \( P_x \) does not halt on input \( x \). Now show that \( H(x, 3x) \) is undecidable, i.e. show there is no program that for all \( x \) can output \( \text{TRUE} \) if program \( P_x \) halts on input \( 3x \) and outputs \( \text{FALSE} \) if program \( P_x \) does not halt on input \( 3x \).

Hint: You will want to build a program \( E \) (similar to the \( E \) for the solution shown in class), but what matters particularly is the action of \( E \) on inputs that are of the form \( 3x \).