CSCE 330 Fall 2017
Quiz 7
Assigned Tuesday, 17-12-05

1. Complete the declaration of the type Op used for the countdown problem example in the video assigned for viewing and in ch.9 [H].
   \[ \text{Op} = \text{Add} \mid \text{Sub} \mid \text{Mul} \mid \text{Div} \]
   Answer: \[ \text{Op} = \text{Add} \mid \text{Sub} \mid \text{Mul} \mid \text{Div} \]

2. Complete the definition of the function apply that applies an operator to two integers. Assume that the integers have checked for validity.
   \[ \text{apply} :: \text{Op} \to \text{Int} \to \text{Int} \to \text{Int} \]
   \[ \text{apply Add} x y = x + y \]
   \[ \text{apply Sub} x y = x - y \]
   \[ \text{apply Mul} x y = x \times y \]
   \[ \text{apply Div} x y = x \div y \]
   Answer: \[ \text{apply} :: \text{Op} \to \text{Int} \to \text{Int} \to \text{Int} \]
   \[ \text{apply Add} x y = x + y \]
   \[ \text{apply Sub} x y = x - y \]
   \[ \text{apply Mul} x y = x \times y \]
   \[ \text{apply Div} x y = x \div y \]

3. Define a type Expr for numeric expressions, which can either be an integer value or the application of an operator to two argument expressions.
   \[ \text{data Expr} = \]
   \[ \text{Val Int} \mid \text{app Op Expr Expr} \]
   Answer: \[ \text{data Expr} = \text{Val Int} \mid \text{app Op Expr Expr} \]

4. Is this type recursive? Answer: Yes.