

**TIE4203 Decision Analysis in Industrial & Operations Management**  
**Tutorial #10**

**Question 1 (P11.1)**

- (a) Ella is risk neutral and is offered a dice tossing game: A fair dice is thrown and Ella will receive  $\$100x$  if the outcome is  $x$  points (where  $x = 1, 2, \dots, 6$ ). What is Ella's personal indifferent buying price for the game?
- (b) Suppose Ella can purchase the game in part (a) with an option to throw the dice again after making the first throw. If she does throw the dice again, she will be paid based on the outcome of the second throw. What is Ella's personal indifferent buying price for the game with a re-throw option? What is the value of the re-throw option?
- (c) Suppose Ella can purchase the game in part (a) with options for up to two re-throws and she will be paid based on the outcome of the final throw. What is Ella's personal indifferent buying price for the game with two re-throw options? What is the value of the option with up to two re-throw?

**Question 2 (P11.2)**

Repeat Problem 11.1 if Ella is risk averse with a constant risk tolerance of \$200. Compare the results obtained here with those in Problem 10.1.

### Question 3 (P11.3)

A startup company has recently developed a new product based on a new technology. The product has two major potential markets  $A$  and  $B$ . The success or failure of the product in both markets is not independent. It is assessed that there is a 50% chance that the product will succeed in market  $A$ . Furthermore, if the product is successful in Market  $A$ , it will also succeed in Market  $B$  with probability 0.8, and if the product fails in Market  $A$ , it will also fail in Market  $B$  with probability 0.9.

Market  $A$  requires an initial investment of \$100,000 regardless of when it is entered. One year after entry, it will have a market value of \$160,000 or \$80,000 for product success and failure, respectively.

Market  $B$  requires an initial investment of \$55,000 regardless of when it is entered. One year after entry, it will have a market value of \$140,000 or \$25,000 for product success and failure, respectively.

The company is risk neutral and its  $MARR$  is 5% for this project. Ignore any income taxes.

- (a) If the company must decide on which market (i.e.,  $A$  only,  $B$  only, both  $A$ & $B$ , or Nil) to enter now, what is its best decision and expected  $NPV$ ?
- (b) If the company has the option to delay entering one of the markets by one year, what is its optimal decision policy and expected  $NPV$ ? Note that the company must enter at least one market now in order to be able to enter the other market after one year.
- (c) What is the value of the option to delay entering the market in part (b)?