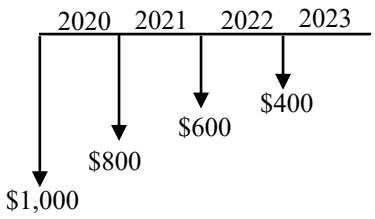
TIE2140 Engineering Economy
Tutorial #1 (The Time Value of Money)

Question 1 (based on Sullivan *et al* 2020, P4-35)

Spivey just won a lottery! The $10,000,000 jackpot will be paid in 25 annual installments of $400,000 each, with the first payment to be paid immediately. Spivey's time value of money is 2% per year. Draw a cash flow diagram representing Spivey's lottery-winning cash flows. What is the present equivalent value of Spivey's lottery winnings at the time of the first payment? Did he really win $10 million?

Question 2 (based on Sullivan *et al* 2014, P4-80)

Given the following cash flows:



Calculate the future equivalent value at the end of 2023 at an interest rate of 8% per year:

(*a*) by using a uniform gradient amount (G) in your solution.

(*b*) without using a uniform gradient amount (G) in your solution.

Question 3 (based on Sullivan *et al* 2014, P4-85)

You are the manager of a large crude-oil refinery. As part of the refining process, a certain heat exchanger (operated at high temperatures and with abrasive material flowing through it) must be replaced every year. The replacement and downtime cost in the first year is $175,000. This cost is expected to increase due to inflation at a rate of 8% per year for five more years, at which time this particular heat exchanger will no longer be needed. If the company's *MARR* is 18% per year, how much could you afford to spend for a higher quality heat exchanger that does not require these annual replacement and downtime costs?

Question 4 (based on Sullivan *et al* 2020, P4-107)

You borrow $5,000 from your bank, which you must repay in the next 48 months through monthly installment at an interest rate of 6% per year *compounded monthly*. Alternatively, you can repay the loan in 60 months but at an interest rate of 9% per year compounded monthly.

(*a*) What is your monthly payment if you repay the loan in 48 months? Assume that the first payment is due one month from now.

(*b*) What is your monthly payment if you repay the loan in 60 months? Assume that the first payment is due one month from now.

Question 5 (based on Sullivan *et al* 2012, P4-110)

On January 1, 2020 a person's savings account was worth $200,000. Every month thereafter, this person makes a cash contribution of $676 to the account. If the fund is expected to be worth $400,000 on January 1, 2025, what annual rate of interest is being earned on this fund?

Question 6 (based on Sullivan *et al* 2020, P4-119)

A student takes out a loan of to pay for her 4-year degree program. She borrows $20,000 from her bank and is to repay the loan in equal monthly installments over 10 years, beginning with the first month after the 4-year degree is completed. The bank charges her an interest rate of 9% per annum compounded continuously. What is the monthly payment due?