Name: KEY Id#

ISE 307, Term 153

ENGINEERING ECONOMIC ANALYSIS

Quiz# 3

Date: Monday, August 15, 2016

# 

# **Q1.** The owner of a business is considering investing $80,000 in new equipment. He estimates that the net cash flows will be $8,000 during the first year and will increase by $2,000 per year each year thereafter. The equipment is estimated to have a 10-year service life and a net salvage value at the end of this time of $10,000. The firm's interest rate is 15%.

1. Determine the annual capital cost (ownership cost) for the equipment.

CR(15%) = (80,000-10,000)(A/P, 15%, 10) + 0.15\*10,000

= 70,000\*0.1993 + 1,500

= $15,451

1. Determine the equivalent annual savings (revenues).

AEsavings(15%) = 8,000 +2,000 (P/G, 15%, 10)(A/P, 15%, 10)

= 8,000 + 2,000\*16.9795\*0.1993

= $14,768.03

OR

AEsavings(15%) = 8,000 +2,000 (A/G, 15%, 10)

= 8,000 + 2,000\*3.3832

= $14,766.4

1. Determine whether this investment is wise.

AE(15%) = 14,768.03 - 15,451 = -$682.97

So, this investment is not wise.

# **Q2.** Consider the following investment projects:

|  |  |  |
| --- | --- | --- |
| *n* | Project 1 | Project 2 |
| 0 | -$1,200 | -$2,000 |
| 1 | 800 | 1,500 |
| 2 | 900 | 1,100 |
| IRR | 26.13% | 20.60% |

Determine the range of MARR for which Project 2 would be preferred over Project 1.

|  |  |
| --- | --- |
| *n* | Project 2 - Project 1 |
| 0 | -$800 |
| 1 | 700 |
| 2 | 200 |

PW2-1=-800 + 700(1 + 𝐼𝑅𝑅2-1)−1+ 200(1 + 𝐼𝑅𝑅2-1)−2 = 0

Let X = (1 + 𝐼𝑅𝑅2-1)−1

* -800 + 700 X + 200 X2 = 0
* -8 + 7X + 2X2 = 0
* X = 0.9075 OR X= -4.4075
* (1 + 𝐼𝑅𝑅2-1)−1 =0.9075
* 1 + 𝐼𝑅𝑅2-1 = 1.1019
* 𝐼𝑅𝑅2-1 = 0.1019 = 10.19%

Project 2 would be preferred over Project 1 for MARR < 10.19