# ISTANBUL TECHNICAL UNIVERSITY

# COMPUTER ENGINEERING DEPARTMENT

## BLG 368E

## OPERATIONS RESEARCH
## ASSIGNMENT 5 REPORT

**DATE** : 02.06.2021


**STUDENT:**

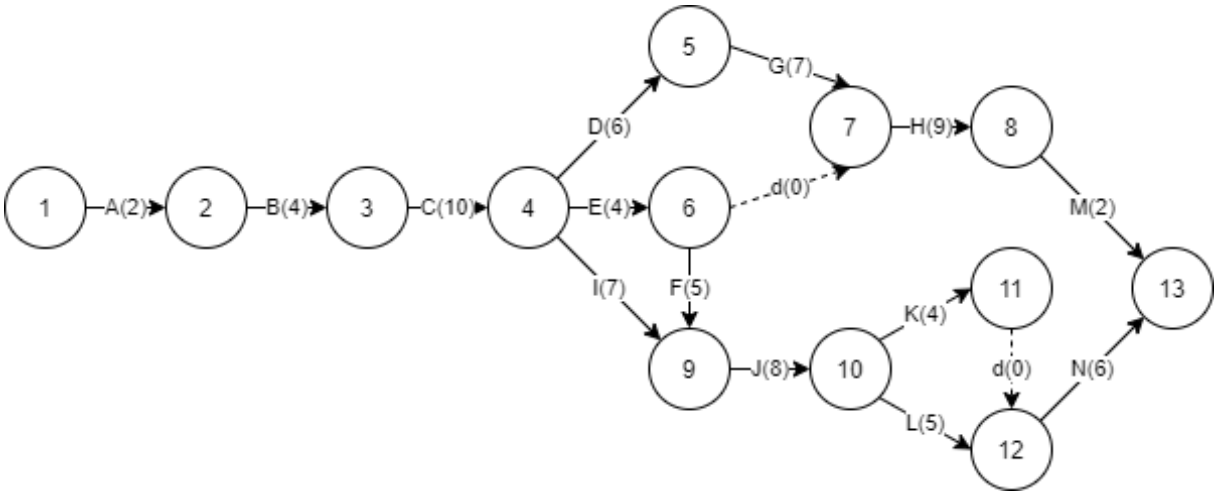
NAME : ABDULKADİR

SURNAME : PAZAR

NUMBER : 150180028


**SPRING 2021**

# Part a)




Network Diagram

# Part b,c,d)

Expected completion time and variance can be calculated using following formulae where a is optimistic time m is most likely and b is pessimistic time:

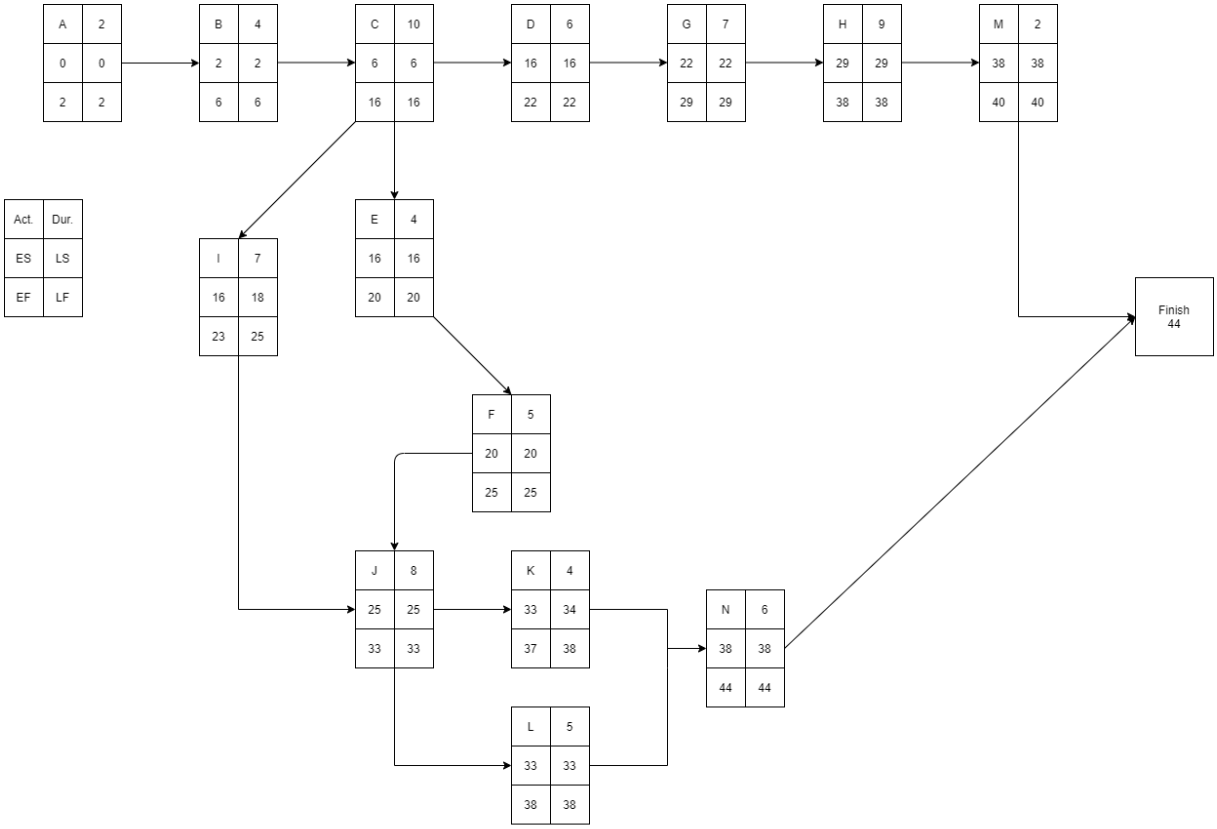
$$e = \frac{a + 4m + b}{6}$$

$$\sigma^2 = \left(\frac{b - a}{6}\right)^2$$

| Activity | Optimistic | Most likely | Pessimistic | Expected | Variance |
|---|---|---|---|---|---|
| A | 1 | 2 | 3 | 2 | 0.111111 |
| B | 2 | 3.5 | 8 | 4 | 1 |
| C | 6 | 9 | 18 | 10 | 4 |
| D | 4 | 5.5 | 10 | 6 | 1 |
| E | 1 | 4.5 | 5 | 4 | 0.444444 |
| F | 4 | 4 | 10 | 5 | 1 |
| G | 5 | 6.5 | 11 | 7 | 1 |
| H | 5 | 8 | 17 | 9 | 4 |
| I | 3 | 7.5 | 9 | 7 | 1 |
| J | 3 | 9 | 9 | 8 | 1 |
| K | 4 | 4 | 4 | 4 | 0 |
| L | 1 | 5.5 | 7 | 5 | 1 |
| M | 1 | 2 | 3 | 2 | 0.111111 |
| N | 5 | 5.5 | 9 | 6 | 0.444444 |
| | | | | | |
| | | | Project Variance | | 9 |
| | | | Project Std. Dev. | | 3 |

Expected times and variances calculated by Excel

To find the critical path we can construct the PERT Network as follows:




PERT Network

The project variance is simply the sum of variances of the projects along the critical path.

$$\sigma_A^2 + \sigma_B^2 + \sigma_C^2 + \sigma_E^2 + \sigma_F^2 + \sigma_J^2 + \sigma_L^2 + \sigma_N^2 = \sigma_{Project}^2$$

$$0.111111 + 1 + 4 + 0.444444 + 1 + 1 + 1 + 0.444444 = 9$$

Minimum completion time is 44 as shown in the PERT Network diagram.

# Part e)

Probability can be calculated using z tables:

$$F\left(\frac{x-\mu}{\sigma}\right) = F\left(\frac{35-44}{3}\right) = F(-3) \approx 0.0013$$