1. The following information has been gathered for a project
   1. Draw a network diagram
   2. Calculate the slack for each activity and determine the critical path. How long will the project take.

|  |  |  |
| --- | --- | --- |
| Activity | Activity Time (Weeks) | Immediate Predecessor |
| A | 4 | - |
| B | 7 | A |
| C | 9 | B |
| D | 3 | B |
| E | 14 | D |
| F | 10 | C, D |
| G | 11 | F, E |

1. Barbara Gordon, the project manager for Web Ventures, Inc. compiled a table showing time estimates for each of the activities of a project to upgrade the company’s Web page, including optimistic, most likely, and pessimistic.
   1. Calculate the expected time te, for each activity
   2. Calculate the variance, 2, for each activity

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Optimistic (Days) | Most Likely | Pessimistic |
| A | 3 | 8 | 19 |
| B | 12 | 15 | 18 |
| C | 2 | 6 | 16 |
| D | 4 | 9 | 20 |
| E | 1 | 4 | 7 |

1. Recently you were assigned to manage a project for your company. You have constructed a network diagram depicting the various activities in the project. In addition, you have asked your team to estimate the amount of time that they would expect each of the activities to take. Their responses are shown in the following table and diagram.
2. What is the expected completion time of the project?
3. What is the probability of completing the project in 21 days?
4. What is the probability of completing the project in 17 days?



|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Optimistic | Most Likely | Pessimistic |
| A | 5 | 8 | 11 |
| B | 4 | 8 | 11 |
| C | 5 | 6 | 7 |
| D | 2 | 4 | 6 |
| E | 4 | 7 | 10 |

1. The project manager of Good Public Relations gathered the data shown below for a new advertising campaign.
   1. How long is the project likely to take
   2. What is the probability that the project will take more than 38 weeks?
   3. Consider the path A-E-G-H-J. What is the probability that this path will exceed 38 weeks?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Optimistic (Weeks) | Most Likely | Pessimistic | Immediate Predecessors |
| A | 8 | 10 | 12 | START |
| B | 5 | 8 | 17 | START |
| C | 7 | 8 | 9 | START |
| D | 1 | 2 | 3 | B |
| E | 8 | 10 | 12 | A, C |
| F | 5 | 6 | 7 | D, E |
| G | 1 | 3 | 5 | D, E |
| H | 2 | 5 | 8 | F, G |
| I | 2 | 4 | 6 | G |
| J | 4 | 5 | 8 | H |
| K | 2 | 2 | 2 | H |

1. Consider the office renovation project data in below table. A “zero” time estimate means that the activity could take a very small amount of time and should be treated as a numeric zero in the analysis.
   1. Based on the critical path (List critical Path), find the probability of completing the office renovations project by 39 days.
   2. Find the date by which you would be 90 percent sure of completing the project.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Optimistic | Most Likely | Pessimistic | Immediate Predecessor |
| START | 0 | 0 | 0 | - |
| a | 6 | 10 | 14 | START |
| B | 0 | 1 | 2 | A |
| C | 16 | 20 | 30 | A |
| D | 3 | 5 | 7 | B |
| E | 2 | 3 | 4 | D |
| F | 7 | 10 | 13 | C |
| G | 1 | 2 | 3 | D |
| H | 0 | 2 | 4 | G |
| I | 2 | 2 | 2 | C, G |
| J | 2 | 3 | 4 | I |
| K | 0 | 1 | 2 | H |
| L | 1 | 2 | 3 | J, K |
| FINISH | 0 | 0 | 0 | E, F, L |

1. You are in charge of a project at the local community center. The center needs to remodel one of the rooms in time for the start of a new program. Delays in the project mean that the center must rent another space at a nearby church at additional cost. Time and cost data for your project are contained in table below. Your interest is in minimizing the cost of the project to the community center.
   1. Using the normal times for each activity, what is the earliest date you can complete the project?
   2. Suppose the variable overhead costs are $50 per day for your project. Also, suppose that the center must pay $40 per day for a temporary room on day 15 or beyond. Find the minimum-cost project schedule

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Activity | Normal Time (Days) | Normal Cost ($) | Crash Time (days) | Crash Cost ($) | Immediate Predecessors |
| START | 0 | 0 | 0 | 0 | - |
| A | 10 | 50 | 8 | 150 | START |
| B | 4 | 40 | 2 | 200 | START |
| C | 7 | 70 | 6 | 160 | B |
| D | 2 | 20 | 1 | 50 | A, C |
| E | 3 | 30 | 3 | 30 | A, C |
| F | 8 | 80 | 5 | 290 | B |
| G | 5 | 50 | 4 | 180 | D |
| H | 6 | 60 | 3 | 180 | E, F |
| FINISH | 0 | 0 | 0 | 0 | G, H |

1. The information in table below is available for a large fundraising project.
   1. Determine the critical path and the expected completion time of the project.
   2. Plot the total project cost, starting from day to the expected completion date of the project, assuming the earliest start times for each activity. Compare that result to a similar plot for the latest start times. What implications does the time differential have for cash flows and project scheduling?

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Activity Time (days) | Activity Cost ($) | Immediate Predecessor |
| A | 3 | 100 | - |
| B | 4 | 150 | - |
| C | 2 | 125 | A |
| D | 5 | 175 | B |
| E | 3 | 150 | B |
| F | 4 | 200 | C, D |
| G | 6 | 75 | C |
| H | 2 | 50 | C, D, E |
| I | 1 | 100 | E |
| J | 4 | 75 | D, E |
| K | 3 | 150 | F, G |
| L | 3 | 150 | G, H, I |
| M | 2 | 100 | I, J |
| N | 4 | 175 | K, M |
| O | 1 | 200 | H, M |
| P | 5 | 150 | N, L, O |