3. The Westchester Chamber of Commerce periodically sponsors public service seminars and programs. Currently, promotional plans are under way for this year's program. Advertising alternatives include television, radio, and newspaper. Audience exposure estimates, cost per ad, and the maximum number of each media that are desired are shown below. For example, each television ad reaches 100,000 people, costs $2,000, and the company wishes to use no more than 10 of these.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Television | Radio | Newspaper |
| Audience reached per advertisement | 100,000 | 24,000 | 40,000 |
| Cost per advertisement | $2,000 | $400 | $800 |
| Maximum media usage | 10 | 20 | 10 |

Also, to ensure a balanced usage of advertising media, television advertisements must not exceed 50% of the total number of advertisements authorized. In addition, it has been requested that television account for at least 10% of the total number of advertisements authorized. The promotional budget is limited to $18,200. Linear programming is to be used to determine how many commercial messages to use on each medium to maximize total audience contact.

1. Carefully define the decision variables.
2. Set up the linear program.