ASSIGNMENT-١: Optimization, LP Model-Graphical SolutionDate: ٩٢/٠١/٢٢

١-   Logo-motion is a sports apparel firm that manufactures jackets, hats, sweat outfits, and T-shirts for college and professional athletic teams. It has contracted with the State University Bookstore for two types of logo jackets, a deluxe jacket and a regular jacket. The deluxe jacket is heavier, with more pockets, a nicer lining, and an embroidered school name and logo.   The regular jacket has sewn-on prefabricated logos and lettering.   The major steps in the manufacture of these jackets are cutting the material, sewing, and decorating with embroidery or sewn-on items. The following table shows the resource requirements for each type of jacket and total weekly availability of resources.

School Jacket	Cutting (hr.)	Sewing (hr.)	Decoration (hr.)	Profit ($)
Deluxe	0.16	0.47	0.40	18
Regular	0.15	0.28	0.14	12
Resource Availability	40.00	80.00	55.00	

Formulate a linear programming model to determine how many deluxe and regular jackets the company should produce in order to maximize profit.

٢-   Inform, Inc., a media marketing firm, has contracted with a company to market its product.   The company wants its TV and radio advertising to reach different numbers of customers within three age-groups: over ٤٠, between ٢٥ and ٤٠, and under ٢٥ year old. One minute of TV commercial time costs $٧,٠٠٠ and will reach an average of ١٦,٠٠٠ viewers in the over-٤٠ group, ١٢,٥٠٠ customers in the ٢٥-to-٤٠ group, and ٨,٦٠٠ in the under-٢٥ group. One minute of radio time costs $٢,٥٠٠ and will reach ٤,٥٠٠ listeners in the over-٤٠ age-group, ٨,٠٠٠ in the ٢٥-to-٤٠ age-group, and ١٤,٠٠٠ in the under-٢٥ group. The company wants to have a total exposure of ٦٥,٠٠٠ in the over-٤٠ group, ٨٠,٠٠٠ in the ٢٥-٤٠ age-group, and ٧٠,٠٠٠ in the under-٢٥ group. Formulate an LP model to determine the amount of different commercial minutes to use at the minimum cost.

٣-   Universal Stone House Association (USHA) has an advertising budget of $١٠٠,٠٠٠ to spend each year on television, radio, and direct mailing.   USHA has advertised using all three methods in the past and plans to spend at least ١٠% on each method this year as well. Further, they would like to spend at least as much on direct mailing as television and radio combined since the publisher will give themdiscounts on other business publishing needs. Historical data on the financial returns of each advertising method is summarized below.

Advertising Technique	Rate of Return
Television	8%
Radio	6%
Direct Mailing	6%

How should USHA divide the budget to meet all of the requirements and yet maximize returns? Formulate an LP model to answer this question.