Problem 1

Betty, owner of the Eagle Pub, is preparing for Super Match Sunday, and she must determine how much beer to stock. Betty stocks three brands of beer - B1, B2, and B3. The cost per pint (to the owner) of each brand is as follows.

Brand	Cost/pint
B1	£ 1.30
B2	£ 0.80
B3	£ 1.10

The pub has a budget of £2100 for beer for Super Match Sunday. Betty sells B1 at a rate of £2.25 per pint, B2 at £2.25 per pint, and B3 at £2.25 per pint.

Based on past games, Betty has determined the maximum customer demand to be 500 pints of B1, 600 pints of B2, and 450 pints of B3.

The pub has the capacity to stock 1240 pints of beer; Betty wants to stock up completely.

What is the maximum profit that Betty can get on Super Match Sunday, if she sells all beer stocked?

Problem 2

A small company has 3 builders available to work on the company's 4 current construction projects. Each builder has no more than 89 hours to split among the projects.

The table below shows the manager's scoring (0 = nil to 100 = perfect) of the capability of each builder to contribute to each project, along with his (manager's) estimate of the hours that each project will require.

Builder	Project			
	1	2	3	4
1	50	50	60	80
2	70	80	80	70
3	50	20	30	50
Required	70	55	75	60

What is the maximal score that the manager can achieve by assigning the builders to the construction projects?

Problem 3

A company receives raw materials from three suppliers. The materials have to be further refined on one of the two production sites. The cost of transportation of raw materials from the suppliers to the sites are shown in the table below:

Suppliers	Sites	
	Site 1	Site 2
S1	£7.00	£11.00
S2	£6.00	£9.00
S3	£8.00	£8.00

Suplier S1 can supply up to 120 units of the raw material, suplier S2 can supply up to 140 units, and suplier S3 can supply up to 120 units per day.

Percentage of refined product obtained on each site and for each supplier are shown in the table below:

	Sites	
Suppliers	Site 1	Site 2
S1	90%	80%
S2	60%	70%
S3	70%	70%

The company wants to produce 210 units of refined product on site 1 and 20 units of refined product on site 2 daily.
What is the minimal transportation cost of satisfying the company's daily demand?

Problem 4
The Archer family raises cattle on their farm in West Midlands. They also have a large garden in which they grow ingredients for making two types of relish - SauceA and SauceB. These they sell at local stores.

The profit per kilogram of SauceA is £4 and the profit per kilogram of SauceB is £3.5. The ingredients in each relish are cabbage, tomatoes, onions, and oil. One kilogram of SauceA must contain at least 65% but no more than 70% cabbage, and at least 5% onion, and at least 6% oil. One kilogram of SauceB must contain at least 70% but no more than 75% tomatoes, and at least 6% onion, and at least 9% oil. Both relishes contain no more than 12% onion and no more than 12% oil.

The family has enough time to make no more than 490 kilograms of relish. They know also that they will sell at least 40% more SauceA than SauceB. They will have this year 480 kilograms of cabbage, 470 kilograms of tomatoes, and 200 kilograms of onion. They can use any amount of oil needed.

What is the maximal profit that the family can gain by producing and selling the relish?

Problem 5
A catering company must have the following number of clean napkins available at the beginning of the next four days:
    day 1 - 14; day 2 - 12; day 3 - 10; day 4 - 9.
After being used, a napkin can be cleaned by one of two methods: fast service or slow service. Fast service costs 12p per napkin, and a napkin cleaned via fast service is available for use the day after it is last used, for example a napkin used at day 1 can be used at day 2, if it is cleaned via fast service.

Slow service costs 6p per napkin, and a napkin cleaned via slow service is available for use two days after it is last used, for example a napkin used at day 1 can be used only at day 3, if it is cleaned via slow service.

A new napkin can be purchased for a cost of 25p per napkin.
What is the minimal cost **(in pounds!)** of meeting the demand for napkins during the next four days?