SeriesNumber 68

Problem 1

A local appliance store has decided on an advertising campaign utilising newspaper and radio.
Each pound spent on newspaper advertising is expected to reach 40 people in 'Under £25,000' and 20 in the 'Over £25,000' bracket.
Each pound spent on radio advertising is expected to reach 20 people in 'Under £25,000' and 40 in the 'Over £25,000' bracket.
If the store wants to reach at least 110000 people in the 'Under £25,000' and at least 144000 in the 'Over £25,000' bracket, what is the minimum cost of the advertising campaign?

Problem 2

Smart Rug Manufacturers has available1800 square meters of wool and 1800 square meters of nylon for the manufacture of two grades of carpeting: high-grade, which sells for £800 per roll, and low-grade, which sells for £600 per roll.
35 square meters of wool and 10 square meters of nylon are used in a roll of high-grade carpet.
15 square meters of wool and 40 square meters of nylon are used in a roll of low-grade carpet.
30 work-hours are required to manufacture each roll of the high-grade carpet, and 20 work-hours are required for each roll of the low-grade carpet, at an average cost of £4 per work-hour. A maximum of 700 work-hours are available.
The cost of wool is £5 per square meter and the cost of nylon is £3 per square meter.
What is the maximum income that can be achieved by manufacturing the carpets?
Hint :_Income=revenue from sale-(production cost for material+labor)

Problem 3

Sanders Fishing Supply of Naples, Florida, manufactures a variety of fishing equipment, which it sells throughout the United States.
For the next three months, Sanders estimates demand for a particular product at 160, 190, and 100 units, respectively. Sunders can supply this demand by producing on regular time or overtime.
Because of other commitments and anticipated cost increases in month 3, the production capacities in units and the production costs per unit are as follows:

Production	*Capacity*	*Cost/unit*
Month 1 - regular	80	$35.00
Month 1 - overtime	145	$55.00
Month 2 - regular	105	$55.00
Month 2 - overtime	145	$75.00
Month 3 - regular	130	$70.00
Month 3 - overtime	45	$110.00

Inventory may be carried from one month to the next, but the holding cost is $28 per unit per month.
What is the minimal cost of meeting demands in the next three months?

Problem 4

Oilco has oil fields in San Diego and Los Angeles. The San Diego field can produce 35500 barrels per day, and the Los Angeles field can produce 55500 barrels per day.

Oil is sent from the fields to a refinery, either in Dallas or in Houston (assume that each refinery has unlimited capacity). It costs $80 to refine 1000 barrels of oil at Dallas and $60 at Houston. Refined oil is shipped to customers in Chicago and New York. Chicago customers require 35000 barrels per day of refined oil; New York customers require 39000. The costs of shipping 1000 barrels of oil (refined or unrefined) between cities are given in the table below.

	To			
From	Dallas	Houston	N.Y.	Chicago
L.A.	$30.00	$45.00		
San Diego	$30.00	$25.00		
Dallas			$45.00	$45.00
Houston			$45.00	$40.00

What is the minimal cost of satisfying demands in refined oil in Chicago and New York? (Assume that it is not allowed to send more oil than required)

Problem 5

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:

	Sites	
Suppliers	Site 1	Site 2
S1	£11.00	£11.00
S2	£7.00	£6.00
S3	£10.00	£7.00

Suplier S1 can supply up to 90 units of the raw material, suplier S2 can supply up to 110 units, and suplier S3 can supply up to 50 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	70%	90%
S2	60%	80%
S3	60%	60%

The company wants to produce 100 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?