Homework Assignment # 2

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Problem 1

$X \sim N(5, 10)$ (Read X distributed Normal with mean 5 and var 10) Compute:

(i) Prob$(X > 5)$

(ii) Prob$(X > 5 + 2 \times \sqrt{10})$

(iii) Prob $(X = 8)$

(iv) Express Prob$(-2 \leq X \leq 6)$ in terms of Z, the standard normal random variable.

Problem 2

A company can purchase raw material from either of two suppliers and is concerned about the amounts of impurity the material contains. A review of the records for each supplier indicates that the percentage impurity levels in consignments of the raw material follow normal distributions with the means and standard deviations given in the table below. The company is particularly anxious that the impurity level in a consignment not exceed 5% and want to purchase from the supplier more likely to meet that specification. Which supplier should be chosen?

	Mean	Standard Deviation
Supplier A	4.4	0.4
Supplier B	4.2	0.6

Problem 3

This problem is named after the host of the long running TV show *Let's make a deal*.
There has been a vigorous debate about what the correct answer is!!
A contestant must choose one of three closed doors.
There is a prize (say a car) behind one of the three doors.
Behind the other two doors, there is something worthless (traditionally a goat).
After the contestant chooses one of the three doors, Monty opens one of the other two, revealing a goat (never the car!!).
There are now two closed doors.
The contestant is asked whether he would like to switch from the door he intially chose, to the other closed door.

The contestant will get whatever is behind the door he has finally chosen.

Should he switch?

Problem 4

An oil company has purchased an option on land in Midland, TX. Preliminary geological studies have assigned the following probabilities of finding oil in the land:

$$Pr(\text{high quality oil}) = 0.5 \quad Pr(\text{medium quality oil}) = 0.2 \quad Pr(\text{NO oil}) = 0.3$$

After buying the option the company decided to perform a soil test. They found soil "type A". The probabilities of finding this particular type of soil are as follow:

$Pr(\text{soil} = \text{"type A"}|\text{high quality oil}) = 0.2$
$Pr(\text{soil} = \text{"type A"}|\text{medium quality oil}) = 0.8$
$Pr(\text{soil} = \text{"type A"}|\text{NO oil}) = 0.2$

1. Given the information from the soil test what is the probability the company will find oil in this land?

2. Before deciding to drill in the land the company has to perform a cost/benefit analysis of the project. They know it will cost \$1,000,000 to drill and start operating a well. In addition, under current oil prices, they access that if oil is found (any kind) the revenue stream will be of \$1,500,000. Should they exercise the option, ie, should they drill?