Answer the problems on **separate** paper. You do not need to rewrite the problem statements on your answer sheets. Do your own work. **Show all relevant steps** which lead to your solutions. Attach this question sheet to the front of your answer sheets.

1. During one stage of an assembly process, a communications chips is soldered on to a circuit board. Typically 20 % of the soldered chips have to be redone. If an inspector randomly selects 14 of the circuit boards, what is the probability that the soldering process will need to be redone for no more than 4 of the circuit boards.

2. A grievance committee of 5 is to be selected from a panel of 6 men and 9 women. What is the probability that the grievance committee will contain a majority of women?

3. The number of cars which pass a check point and have noticeable emissions is 18 per hour on the average. What is the probability that during a 15 minute period there will be at least 8 cars which pass the check point with noticeable emissions?

4. The average height of 7th grade girls in Norway is a random variable which is normally distributed with mean $m = 155$ centimeters and variance $s^2 = 130$.

    a. What is the probability that a (randomly selected) 7th grade girl from Norway will be taller than 172 centimeters?

    b. What is the probability that a (randomly selected) 7th grade girl from Norway will be shorter than 148 centimeters?

5. According the DMI, during the teenage years (13-19) 64% of teenage athletes will have tried performance enhancing steroids. If 140 athletes (age 20) are selected randomly, what is the probability that more than 100 of them will have tried performance enhancing steroids during their teenage years?

6. Steel springs are manufactured by Gehring Steel for use in automobile suspensions. The spring specs require that the thickness of the springs have a mean of 1.105 cm and a standard deviation of 0.065 cm. If a batch of springs for the automobile suspensions is produced which meets the specs, what is the probability that a randomly selected sample of 45 springs from the batch will have a mean thickness between 1.100 and 1.122?

7. Inspecting egg cartons prior to their shipment, a quality-control engineer exams 8 cartons (chosen at random), each of which contains 30 tiles. The following table reports the number of cracked eggs in each of the chosen cartons.

Carton Number	1	2	3	4	5	6	7	8
Number of Cracked Eggs	2	1	0	1	0	1	1	0

    Assuming that the data can be treated as a random sample from a population which is approximately normal, what is the maximum error (at the 98% confidence level) between the sample mean for the number of cracked eggs per carton and the true population mean for the number of cracked eggs per carton?

8. Measurements of the acidity (pH) of rain samples were recorded at 15 sites in an industrial region:

    3.5, 5.1, 5.0, 3.6, 4.8, 3.6, 4.7, 4.3, 4.2, 4.5, 4.9, 4.7, 4.8, 3.4, 4.2

    Determine a 95% confidence interval for the mean acidity of rain in that region.

9. Historically, there has been a probability of 23% that a randomly selected bat from Monument Caverns has rabies. If seven bats are randomly selected from Monument Caverns, what is the probability that at between 1 and 3 of them will have rabies?

10. A distributer sells a chlorine-water mixture in liter bottles. Suppose the percentage of chlorine in a chlorine-water mixture is normally distributed with a mean of 11%. If the probability of selecting a mixture with 11.35% or more chlorine is 0.22, what is the standard deviation for the distribution?