Assignment Problems

1. X is a normally normally distributed variable with mean $? = 30$ and standard deviation $? = 4$. Find:
   (a) $P(X < 40)$
   (b) $P(X > 21)$
   (c) $P(30 < X < 35)$
2. A radar unit is used to measure speeds of cars on a motorway. The speeds are normally distributed with a mean of 90 km/hr and a standard deviation of 10 km/hr. What is the probability that a car picked at random is travelling at more than 100 km/hr?
3. For a certain type of computers, the length of time bewteen charges of the battery is normally distributed with a mean of 50 hours and a standard deviation of 15 hours. John owns one of these computers and wants to know the probability that the length of time will be between 50 and 70 hours.
4. Entry to a certain University is determined by a national level test. The scores on this test are normally distributed with a mean of 500 and a standard deviation of 100. Tom wants to be admitted to this university and he knows that he must score better than at least 70% of the students who took the test. Tom takes the test and scores 585. Will he be admitted to this university?
5. The length of similar components produced by a company are approximated by a normal distribution model with a mean of 5 cm and a standard deviation of 0.02 cm. If a component is chosen at random,
   (a) what is the probability that the length of this component is between 4.98 and 5.02 cm?
   (b) what is the probability that the length of this component is between 4.96 and 5.04 cm?
6. The length of life of an instrument produced by a machine has a normal ditribution with a mean of 12 months and standard deviation of 2 months. Find the probability that an instrument produced by this machine will last
   (a) less than 7 months.
   (b) between 7 and 12 months.
7. The time taken to assemble a car in a certain plant is a random variable having a normal distribution of 20 hours and a standard deviation of 2 hours. What is the probability that a car can be assembled at this plant in a period of time
   (a) less than 19.5 hours?
   (b) between 20 and 22 hours?
8. A large group of students took a test in Physics and the final grades have a mean of 70 and a standard deviation of 10. If we can approximate the distribution of these grades by a normal distribution, what percent of the students
   (a) scored higher than 80?
   (b) should pass the test ($grades \geq 60$)?
   (c) should fail the test ($grades < 60$)?
9. Lifetimes of VLSI chips manufactured by a semiconductor manufacturer are approximately Normally distributed with $\mu = 5 \times 10^6$ h and $\sigma = 5 \times 10^5$ h. A computer manufacturer requires that at least 95% of a batch should have a lifetime greater than 4×10^6 h. Will the deal be made?
10. A keyword search program lists the files that contain a given keyword. If it runs through 200 files, and each file contains the keyword with probability 0.36, independently of other files, compute the probability that
    (a) more than 70 files will be listed.
    (b) less than 70 files will be listed.
    (c) exactly 70 files will be listed.