

#### Basic Statistics Assignment 4

1. A manufacturer produces airmail envelopes whose weights is normal with mean  $\mu=1.95$  grams and standard deviation  $\sigma=0.05$  grams. The envelopes are sold in lots of 1000. How many envelopes in a lot will heavier than 2 grams? (Ans: 160)
2. A particular operation calls for the production of a metal tube with the inner diameter equal 0.70 cm. The tolerances allow for a deviation of  $\pm 0.08$  cm. It is assumed that the inner diameter of these tubes is distributed normally with  $\sigma=0.05$  cm. If the nominal diameter is being held at the average, what is:
  - (a) the expected number of defective number of pieces in a sample of 100?
  - (b) The probability of having less than 4 defective pieces in this sample?(Ans: 10.96, 0.00354)
3. The height a university high jumper will clear, each time he jumps, is a normal random variable with mean 164 cm and S.D. 48 mm.
  - (a) What is the greatest height he will jump with probability 0.95?
  - (b) What is the height he will clear only 10% of the time?(Ans: 156.13, 170.14)
4. A machine produces bolts, which are 10% defectives. Find the probability that in a random sample of 400 bolts produced by this machine
  - (a) at most 30,
  - (b) between 20 and 50,
  - (c) between 35 and 45,
  - (d) 55 or more of the bolts, will be defective.(Ans: .0567, .9198, .640, .0079)
5. The weights of a lot of ungraded cabbages are normally distributed with  $\mu=3.25$  kg and  $\sigma=1$  kg. They are sold at \$7 each for small (under 2.5 kg), \$9 each for medium (2.5 to 3.5 kg) and \$10 each for large (over 3.5 kg). How much they should cost per 1000 if 20% profit on purchase price is aimed, assuming no wastage? (Ans: \$7456)
6. A coffee machine discharges an average of 35 gm per cup. If the amount is normally distributed with standard deviation 2.5 gm,
  - (a) What fraction of cups will contain between 33.5 and 36.5 gm?
  - (b) What fraction will overflow if 40 gm cups are used?
  - (c) What size of cup should be used if we require no more than 1 in 20 cups to overflow?
  - (d) If we require no more than 1 in cups contains more than 35 gm, on which mean value must the machine be set, assuming standard deviation unchanged?(Ans: .451, .02275, 39.1, 31.8)