Normal Distribution Questions

1. The mass of a raspberry can be modelled by the distribution $X \sim N(5,2)$

   a) Find the following probabilities
      i. $P(X < 4)$
      ii. $P(X \leq 3)$

   b) John suggests that the mass of a raspberry is not equal to 5g and takes a sample of 60 raspberries and finds the mean to be 5.4. Test at the 5% significance level whether John's suggestion is correct.

2. The mean score on a maths test is 80 and the standard deviation is 10. Peter conducts a two tailed hypothesis test to find out if the distribution has changed using a sample size of 40.

   a) Find the critical regions of this test at the 10% significance level

   Peter finds that the mean score is 82.3

   b) Conduct the test showing clearly your hypothesises

3. $X \sim N(25, \sigma^2)$ find the standard deviation for the following cases

   a) $P(x < 24) = 0.4$

   b) $P(20 < x < 30) = 0.9$