In a particular country, large numbers of ducks live on lakes A and B. The mass, in kg, of a duck on lake A is denoted by x and the mass, in kg, of a duck on lake B is denoted by y. A random sample of 8 ducks is taken from lake A and a random sample of 10 ducks is taken from lake B. Their masses are summarised as follows.

$$\Sigma x = 10.56 \qquad \Sigma x^2 = 14.1775 \qquad \Sigma y = 12.39 \qquad \Sigma y^2 = 15.894$$

A scientist claims that ducks on lake A are heavier on average than ducks on lake B.

(i) Test, at the 10% significance level, whether the scientist's claim is justified. You should assume that both distributions are normal and that their variances are equal. [9]

A second random sample of 8 ducks is taken from lake A and their masses are summarised as

$$\Sigma x = 10.24 \qquad \text{and} \qquad \Sigma(x - \bar{x})^2 = 0.294,$$

where $\bar{x}$ is the sample mean. The scientist now claims that the population mean mass of ducks on lake A is greater than p kg. A test of this claim is carried out at the 10% significance level, using only this second sample from lake A. This test supports the scientist's claim.

(ii) Find the greatest possible value of p. [5]