Edexcel A level Maths Hypothesis testing

Section 1: Using the Normal distribution

Exercise level 1

1. For each of the following, a random sample of size n is taken from a Normal population with known standard deviation. The sample mean $\bar{x}$ is calculated.
In each case find the p-value and carry out the hypothesis tests, given H_0 and H_1 at the significance level indicated.

	σ	n	$\bar{x}$	H_0	H_1	Sig. level
(i)	14	20	247	$\mu = 240$	$\mu \neq 240$	2%
(ii)	15	10	172.9	$\mu = 165$	$\mu > 165$	5%
(iii)	24	15	226	$\mu = 240$	$\mu < 240$	1%

2. The masses of adult students are known to be Normally distributed with mean 67.4 kg and standard deviation 3.8 kg. A sample of size 24 is taken and the mean found to be 65.8 kg. Assuming that the standard deviation is unchanged, test, at the 1% significance level, whether the mean mass of adult students has decreased, giving the critical region for the test.

3. Ball bearings produced by a machine should have diameters of 15 mm. A random sample of the diameters of 80 ball bearings gave a sample mean of 14.64 mm. The standard deviation of the ball bearings is known to be 1.41 mm. Test, at the 2% significance level, whether the mean diameter of the ball bearings has changed, giving the critical region for the test. Assume that the diameters of the ball bearings are Normally distributed.