The questions noted with a star* are of interest regarding the subject, but such questions will not be part of the test.

1. The weight of a sophisticated running shoe is normally distributed with a mean of 340g and a variance of 200 g^2.
(a) What is the probability that a shoe weighs more than 370g? (0.0169)
(b) What must the standard deviation of weight be in order for the company to state that 99.9% of its shoes are less than 370g? (94,28 g^2)
(c) If the variance remains at 200 g^2, what must the mean weight be in order for the company to state that 99.9% of its shoes are less than 370g? (326,4 g)

2. The diameter of the dot produced by a printer is normally distributed with a mean diameter of 0.05 mm and a variance of 10^{-4} mm^2.
(a) What is the probability that the diameter of a dot exceeds 0.065 mm? (0.0668)
(b) What is the probability that a diameter is between 0.04 and 0.065 mm? (0.775)
(c) In what interval will be the diameter with 99% probability? (0.0242…0.0758)

3. A manufacturer produces piston rings for an automobile engine. It is known that ring diameter is normally distributed with a standard deviation of 0.001 millimetres. A random sample of 15 rings has a mean diameter of 74.036 millimetres.
(a) Construct a 99% two-sided confidence interval on the mean piston ring diameter. (74.0353, 74.0367)
(b) Construct a 99% lower-confidence bound on the mean piston ring diameter. Compare the lower bound of this confidence interval with the one in part (a). (74.035)

4. The sugar content of the syrup in canned peaches is normally distributed. A random sample of n=10 cans yields a sample standard deviation of s=1.8 milligrams and sample mean 32.4 g.
(a) Calculate a 90% upper confidence limit for expected value of the sugar content. (33.187)
(b) Calculate a 90% upper confidence limit for the variance of the sugar content. (7.0)

5. The mean water temperature downstream from a power plant cooling tower discharge pipe should be no more than 100°F. Past experience has indicated that the standard deviation of temperature is 2°F. The water temperature is measured on nine randomly chosen days, and the average temperature is found to be 98°F.
(a) Is there evidence that the water temperature is acceptable at alpha=0.05? (H_0: $mu \geq mu_0=100$; H_1:$mu<mu_0=100$; $z_0=-3$; $z_\alpha= -1.644>-3= z_0$ → H_0 is rejected, it is proved that the temperature is acceptable)
(b)* What is the P-value for this test? (0.00135)
(c)* If the null hypothesis is stated as: H_0:$mu \leq mu_0=100$, what is the probability of accepting this, at alpha=0.05 if the water has a true mean temperature of 102°F? (0.0876)

6. The life in hours of a battery is known to be approximately normally distributed, with standard deviation of 1.25 hours. A random sample of 10 batteries has a mean life of 40.5 hours.
(a) Is there evidence to support the claim that battery life exceeds 40 hours? Use alpha=0.05. (H_0: $mu \leq mu_0=40$; H_1:$mu>mu_0=40$; z_0 =1.26 <1.65, fail to reject H0-t, it is not prooved that the life hours is larger than 40 hours)
(b)* What is the P-value for the test in part (a)? (0.1038)
(c)* What is the Beta-error for the test in part (a) if the true mean life is 42 hours? (0.000325)

(d)* Explain how you could answer the question in part (a) by calculating an appropriate confidence bound on life.

7. A paper from *Medicine and Science in Sports and Exercise* investigated ice hockey player performance after electrostimulation training. In summary, there were 17 players and the sample standard deviation of performance was 0.09 seconds.
(a) Is there strong evidence to conclude that the standard deviation of performance time exceeds the historical value of 0.75 seconds? Use alpha=0.05. (H_0: sigma≤$sigma_0$=100; H_1:sigma>$sigma_0$=0.75; khi_0=0.23<26.30 fail to reject H_0)
(b)* Find the *P*-value for this test.(p=0.995)