6.3.2 This is a two-sided t-test with the t statistic equal to -0.55 and the P-value equal to 0.599, which is very high. We conclude that we do not have enough evidence against H_0. A .95-confidence interval for the unknown μ is $(4.382, 5.378)$. Note that the confidence interval contains the value 5, which confirms our conclusion using the above test.

6.3.3 This is a two-sided z-test with the z statistic equal to 5.14 and the P-value equal to 0.000. So we conclude that we have enough evidence against H_0 being true. A .95-confidence interval for the unknown μ is $(63.56, 67.94)$. Note that the confidence interval does not contain the value 60, which confirms our conclusion using the above test.

6.3.6 A .99 confidence interval for μ is given by $(22.70, 29.72)$. The P-value for testing $H_0 : \mu = 24$ is 0.099, so we conclude that there is not much evidence against H_0 being true. Note also that the .99 confidence interval for μ contains the value 24.

6.3.7 To detect if these results are statistically significant or not we need to perform a z-test for testing $H_0 : \mu = 1$. The P-value is given by

$$P\left(|Z| \geq \left|\frac{1.05-1}{\sqrt{0.1/100}}\right|\right) = 2\left[1-\Phi\left(1.581\,1\right)\right] = 2\left(1-0.9431\right) = 0.1138.$$

So these results are not statistically significant at the 5% level, and so we have no evidence against $H_0 : \mu = 1$. Also, the observed difference of $1.05 - 1 = .05$ is well within the range that the manufacturer thinks is of practical significance. So the test has detected a small difference that is not practically significant.

6.3.10 Let θ be the probability of head on a single toss. The sample sizes required so that the margin of error (half of the length) of a $\gamma = 0.95$ confidence interval for θ is less than 0.05, 0.025, 0.005 are given by

$$n \geq \frac{1}{4}\left(\frac{z_{\frac{1+\gamma}{2}}}{\delta}\right)^2$$

So for $\delta = 0.1$ $n > 384.15$, $\delta = 0.05$ $n \geq 1536.6$ and $\delta = 0.01$ $n \geq 38415$.

6.3.12 The sample size that will guarantee that a 0.95-confidence interval for μ is no longer than 1 is given by

$$n \geq \sigma_0^2\left(\frac{z_{\frac{1+\gamma}{2}}}{\delta}\right)^2 = 2\left(\frac{1.96}{0.5}\right)^2 = 30.732$$

So the minimum sample size is 31.