Page 413, problem #1):

a.)
Using equation (6-59), the appropriate $z$ for 95% confidence is 1.96. The resulting interval is:

$$0.66 \pm 1.96 \sqrt{\frac{0.66(1-0.66)}{100}} = 0.66 \pm 0.0928$$

$$= [0.567, 0.753].$$

A 95% one-sided interval is:

$$0.66 - 1.645 \sqrt{\frac{0.66(1-0.66)}{100}} = 0.66 - 0.077925$$

$$= 0.582.$$

b.)
1. $H_0$: $p = 0.55$.
2. $H_A$: $p > 0.55$.
3. The test statistic is given by equation (6-53) with $\# = 0.55$, and the reference distribution is the standard normal distribution. Observed values of $Z$ far above zero will be considered as evidence against $H_0$.
4. The sample gives $z = 2.21$.
5. The observed level of significance is $P($a standard normal random variable $> 2.21) =$

$$= P($a standard normal random variable $< -2.21) = 0.0136.$$

Using Table B-3. This is strong evidence of an improvement in yield.

c.)
Label the small shot size Sample 1 and the large shot size Sample 2.
Using equation (6-67), the resulting interval is:

$$0.66 - 0.53 \pm 1.96 \sqrt{\frac{0.66(1-0.66) + 0.53(1-0.53)}{100}} = 0.13 \pm 0.13487$$

$$= [-0.00487, 0.2649].$$

Because 0 is included in the interval, we have no evidence that there is a difference, if Sample 2 is bigger it is by 0.00487 and if sample 1 is bigger it is by 0.2649.

d.)
1. $H_0$: $p_1 - p_2 = 0$.
2. $H_A$: $p_1 - p_2 \neq 0$.
3. The test statistic is given by equation (6-72), and the reference distribution is the standard normal distribution. Observed values of $Z$ far above or below zero will be considered as evidence against $H_0$.
4. The sample gives $z = 1.87$.
5. The observed level of significance is $2P($a standard normal random variable $> 1.87) =$

$$= 2P($a standard normal random variable $< -1.87) = 2(0.0307) = 0.0614.$$

Using Table B-3. This is moderate evidence that the shot size affects the fraction of pellets conforming.
To ensure that the sample size is large enough (no matter what p really is), assume that $p = 0.5$, and use the conservative interval given by equation (6-57). For 95% confidence, $z = 1.96$, so $\Delta = 1.96 \frac{1}{2\sqrt{n}}$. We want this to be less than or equal to 0.01. Solving the inequality for $n$ gives $n = 9604$. Pollsters use $\hat{p} = 0.03$, resulting in $n = 1068$, which is the minimum sample size that you will usually see when the “margin of error” is ±3%.