Q: A study was conducted to determine if diabetes mellitus is more lethal in men as compared to wmen. It was found that the death rate due to diabetes mellitus was 28.9% among men and 22.5% among women. Suppose the study was conducted using a sample of 100 men and 100 women.

a) What are the appropriate hypotheses?
H_0: the disease is equally lethal for both men and womne
H_a: the disease is more lethal for men than for women. (Note: we could also have answered "the disease is has different lethalities for men and women"; in this case, a two-tailed test would be used in place of the one-tailed test.)

b) Calculate the value of the common proportion $\hat{p}_c$

$\hat{p}_c$ is the weighted average over the entire sample (of men and women). In this case, since the sample sizes are equal, we can simply average them:

$$\hat{p}_c = \frac{.289 + .225}{2} = .257$$

c) Calculate the value of the test statistic.

We use the common proportion as an estimate of the population mean so that we can calculate z as follows:

$$z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}}$$

According to H_0, $p_1 = p_2 = \hat{p}_c$, so this becomes

$$z_0 = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\frac{\hat{p}_c(1-\hat{p}_c)}{n_1} + \frac{\hat{p}_c(1-\hat{p}_c)}{n_2}}}$$

or

$$z_0 = \frac{.289 - .225}{\sqrt{\frac{(.257)(1-.257)}{100} + \frac{(.257)(1-.257)}{100}}} \approx 1.03$$

d) What is the p-value of the test.
According to the table, our z-score corresponds to a percentile of .8485, so $p \approx .15$

e) Since p > 0.05, the evidence is not strong enough to reject the null hypothesis.

f) State your conclusion in the context of the problem
There is not a statistically significant difference in death rates among male and female diabetes patients.