A university president believes that, over the past few years, the average age of students attending his university has changed. To test this hypothesis, an experiment is conducted in which the age of 150 students who have been randomly sampled from the student body is measured. The mean age is 23.5 years. A complete census taken at the university a few years before the experiment showed a mean age of 22.4 years, with a standard deviation of 7.6.

a. **What is the nondirectional alternative hypothesis?**

Nondirectional alternative hypothesis: Over the past few years, the average age of students at the university has changed. Therefore, the sample with $\overline{X}_{obt} = 23.5$ is a random sample from a population where $\mu \neq 22.4$. That is, $\overline{X}_{obt} \neq \mu$.

b. **What is the null hypothesis?**

Null hypothesis: The null hypothesis asserts that it is reasonable to consider the sample with $\overline{X}_{obt} = 23.5$ is a random sample from a population with $\mu = 22.4$. That is, $\overline{X}_{obt} = \mu$.

c. **Using $\alpha = .05$ 2 tail, what is the conclusion?**

**Step 1: Calculate the appropriate statistic.**

The data are given in the problem.

$$z_{obt} = \frac{\overline{X}_{obt} - \mu}{\sigma_{\overline{X}}} = \frac{\overline{X}_{obt} - \mu}{\frac{\sigma}{\sqrt{N}}} = \frac{23.5 - 22.4}{\frac{7.6}{\sqrt{150}}} = \frac{1.1}{.6205} = 1.77$$

**Step 2. Evaluate the statistic based on its sampling distribution.**

The decision rule is as follows: If $|z_{obt}| \geq |z_{crit}|$, reject $H_0$. If not, retain $H_0$.

Since $\alpha = .05$ 2 tail, from Table A, $z_{crit} = \pm 1.96$

Since $|z_{obt}| < 1.96$, it does not fall within the critical region for rejection of $H_0$ (i.e., does not fall in the tail). Therefore, we retain $H_0$. We cannot conclude that the average age of students attending the university has changed.