Binomial Proportions Practice Question

It is estimated that by the age 9.2 months, 75% of infants have already begun to walk by holding onto large stationary objects, such as furniture. In some cultures, early walking is of concern to parents. In one area of rural Mexico, families heat their homes with an open fire in the center of their main living area. Infants who are not cognitively mature enough to appreciate the hazards of fire are at risk for injury. Consequently, they are not actively encouraged to learn to walk at an early age. A researcher wishes to ascertain if such situations delay motor development. Mothers of 500 Mexican children from this rural area are interviewed and results indicated that 350 of the children began to walk by 9.2 months of age. Is there evidence that a larger proportion of children in this sample has not learned to walk by the age of 9.2 months? (use alpha = .05)

Form a 95% confidence interval.

Step 1: Ho: P $\leq$0.25
Ha: P > 0.25

Step 2: $z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0\, q_0}{n}}}$

Step 3: The rejection region is located in the z table.
This a one-tailed, directional
test with alpha in the upper tail.
Reject Ho if the obtained value of z is greater
than +1.645.

Step 4:

$$\hat{p} = \frac{150}{500} = .30$$

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0\, q_0}{n}}}$$

$$z = \frac{.30 - .25}{\sqrt{\frac{.25\ (.75)}{500}}} = 2.58$$

Step 5: Since the obtained value of z is in the rejection region, reject Ho and accept Ha. Conclude that a greater proportion of children in this rural area of Mexico begin to walk at a later age than other children.Since there is evidence that a greater proportion of children in this population begin to walk late, estimate, with 95% confidence the proportion of children starting walking later than 9.2 months.

$$\hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}\,\hat{q}}{n}}$$

$$.30 \pm 1.96 \sqrt{\frac{.3\ (.7)}{500}}$$

$$.260 \leq p \leq .340$$