Lesson #25: Boundary Value Problems
with Linear Dielectrics

Name: _____

Study section 4.4.2 (and Example 4.7 in particular), then answer the following questions.

1. Examine Eq. 4.45, the potential outside the dielectric sphere. Why do we need to include the extra term $-E_0 r \cos\theta$, when we never needed this term before? And won't this term cause the potential to blow up as $r \to \infty$? Explain why this extra term is necessary.

2. Eq. 4.46 and 4.47 can be used to obtain the results shown Eq. 4.48, although the author does not show the mathematical steps. Work through these steps now for yourself.

3. Example 4.7 finds the potential inside the dielectric sphere; write down the potential <u>outside</u> the sphere, and show that it has the correct limiting behavior as $r \to \infty$.