COLORADO SCHOOL OF MINES
ELECTRICAL ENGINEERING & COMPUTER SCIENCE DEPARTMENT

EENG-382
Engineering Circuit Analysis (Circuits II)
Spring 2014

Handwritten Homework #4 (HW04)

Problem #1

Scenario: You work for Pearson Education (the publisher of the textbook) as a Subject Matter Expert (SME). A reader has submitted the following feedback to the editor, who has then assigned you the task of clearing things up by indicating what, if any, corrections need to be made to either the textbook or MasteringEngineering and supporting your recommendation with both an "intuitive" explanation and a detailed technical verification of all of the material regarding the instantaneous power in three-phase circuits.

Dear Pearson,

The material described below from your textbook and the companion MasteringEngineering website appear to be either wrong or at least inconsistent. Please review and correct as needed.

In Section 11.5 of the textbook (p412), the author makes the claim that the total instantaneous power in a balanced three phase circuit is

$$p_T = 1.5 V_m I_m \cos\theta_\varphi$$

They further make the claim that this is consistent with Eq. 11.35.

In the chapter summary, (p419), they state, "The total instantaneous power in a balanced three-phase circuit is constant and equals 1.5 times the average power per phase. (See page 412.)"

Finally, in the MasteringEngineering ME03 assignment, Part D of the Balanced Three-Phase Voltages tutorial offers as one of the possible answers to the question of the advantages of three-phase generation the following: "The total power available is constant and equal to three times the average power per phase." This is considered an incorrect answer on the basis that, "The total power available is equal to 1.5 times the average power per phase."