Electronic Journal: Southwest Journal of Pure and Applied Mathematics
Internet: http://rattler.cameron.edu/swjpam.html
ISBN 1083-0464
Issue 1 July, 2004, pp. 54 – 56
Submitted: April 24, 2004. Published: July 1, 2004

PROVING MATRIX EQUATIONS

MICHAEL DEUTCH

Abstract. Students taking an undergraduate Linear Algebra course may face problems like this one (ref[1]):
Given $A_\lambda = (\lambda - A)^{-1}$ and $A_\mu = (\mu - A)^{-1}$
then prove

$$(\lambda - \mu)A_\lambda A_\mu = A_\mu - A_\lambda \tag{1}$$

where λ and μ are scalars and A_λ, A_μ and A are invertible $n \times n$ matrices.

The purpose of the note is to present a general method for determining the truth of symbolic matrix equations where 0 or more such equations are given as true. The idea behind the method is to write the equation to be proved in terms of independent variables only, removing all the dependent variables, effectively reducing the problem to the case of 0 equations given as true. It should then be a simple matter to determine the truth of the equation to be proved, as it must be true for all values of any variable in the equation.

A.M.S. (MOS) Subject Classification Codes. 15A24.
Key Words and Phrases. Symbolic matrix equation, dependent/independent variable, primitive number, normal form.

San Rafael, CA 94901-2526
E-mail: mdeutch3@comcast.net