MATH 2111: Additional Explanations and Hints to Week 10 Tutorial

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Abstract

This document is provided as a part of supplemental materials for MATH 2111 Matrix Algebra and Applications (2015 autumn). Although it is written in the hope that it will be useful, nothing contained in this document represents the official views or policies of this course. Comments and suggestions are welcomed to be sent to the author (xweiaf@connect.ust.hk).

1 Problem 1

Assume that $\exists a, b, c, d \in \mathcal{R}$, s.t.

$$p(t) = a(1+t) + b(t+t^2) + c(t^2+t^3) + d(t^3+t^4). \tag{1}$$

Using the fact that $p(0) = 1$, we have $a = 1$. Similarly, by solving the simple equations obtained from taking derivatives on both sides of Eqn. 1 and taking values at 0, we can derive a necessary condition for the equaion to hold as $a = 1, b = -1, c = 1, d = -1$.

Note that this is only ONE necessary condition! To prove the conclusion, we have to substitude it back into Eqn. 1 and verify the equivalence. Therefore we have

$$p(t) = (1+t) - (t+t^2) + (t^2+t^3) - (t^3+t^4). \tag{2}$$

Remark 1.1. If there are conflicts come out of different necessary conditions, then the implication is that the linear dependence assumption is wrong, and $p(t)$ is not a linear combination of the right hand side functions.