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AMSC 460 - HW11

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clear all; format compact; close all; syms f(x) x y z
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Problem 1

Use Newton's divided differences to find the Newton table, and a polynomial for interpolating the points $(-1, 0), (2, 1), (3, 1), (5, 2)$.

$$\begin{aligned} P(x) &= 1/3*(x+1)-1/12(x+1)(x-2) + 1/24(x+1)(x-2)(x-3) \\ &= (1/3)x+1/3 -(1/12)x^2+(1/12)x+1/6 +(1/24)x^3-(1/6)x^2+(1/24)x+1/4 \\ &= (1/24)x^3-(1/4)x^2+(11/24)x+3/4 \end{aligned}$$

Problem 2 (

Let $P(x)$ be the degree 10 polynomial taking the value zero at $x = 1, 2, \dots, 10$ and where $P(12) = 66$. Find $P(0)$. (Hint: Choose the interpolant basis wisely.)

$$P(x) = a(x-1)(x-2)(x-3)\dots(x-10) \text{ and } P(12) = 66 \quad P(12) = a(12-1)(12-2)(12-3)\dots(12-10) = 66$$

$$a * 11! = 66 \text{ so we have } a = 66/11!$$

$$\text{Therefore } P(x) = 66/11!(x-1)(x-2)(x-3)\dots(x-10) \text{ So we can say } P(0) = (66/11!)*10! = 66/11 = 6$$