CMPSCI 145 Homework
Parametric Equations
Professor William T. Verts

Fill in the sheet, write your name at the top, take a picture with your phone, and email the picture to **`literacy@cs.umass.edu`**

1. There are three points in 4-dimensional space defined as follows:

   P0: *<4,8,2,5>*
   P1: *<10,2,6,9>*
   P2: *<2,12,9,1>*

   Generate the parametric equations for each of the four dimensions. Each equation will be of the form $F(t) = at^2 + bt + c$, where a, b, and c are constants (numbers). Refer to the four dimensions as x, y, z, and w, so the four equations you will generate will be as follows (fill in the blanks with the correct constants):

$$x(t) = \_\_\_\_ t^2 + \_\_\_\_ t + \_\_\_\_$$
$$y(t) = \_\_\_\_ t^2 + \_\_\_\_ t + \_\_\_\_$$
$$z(t) = \_\_\_\_ t^2 + \_\_\_\_ t + \_\_\_\_$$
$$w(t) = \_\_\_\_ t^2 + \_\_\_\_ t + \_\_\_\_$$

2. I want to pass a quartic function through five points P_0, P_1, P_2, P_3, and P_4. The curve should go through P_0 at $t=0$, P_1 at $t=¼$, P_2 at $t=½$, P_3 at $t=¾$, and P_4 at $t=1$. Fill in the following template for LaGrange Interpolation to show how we would go about generating the parametric equations for this problem (you do not need to reduce the equations).

$$\frac{(t-\_\_)(t-\_\_)(t-\_\_)(t-\_\_)}{(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)} P_0 +$$

$$\frac{(t-\_\_)(t-\_\_)(t-\_\_)(t-\_\_)}{(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)} P_1 +$$

$$\frac{(t-\_\_)(t-\_\_)(t-\_\_)(t-\_\_)}{(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)} P_2 +$$

$$\frac{(t-\_\_)(t-\_\_)(t-\_\_)(t-\_\_)}{(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)} P_3 +$$

$$\frac{(t-\_\_)(t-\_\_)(t-\_\_)(t-\_\_)}{(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)(\_\_-\_\_)} P_4$$