

**Homework 6**

Work,

**Burden-Faires: 4.1.5**

**Burden-Faires: 4.1.27** using the function  $f(x) = \cos(x)$  at  $x = 1$ . Compare the numerical derivatives you calculate to the actual value for the derivative,  $f'(1)$ .

**Burden-Faires: 4.2.9**

**Burden-Faires: 4.3.1(a,b), 4.3.3(a,b), 4.3.5(a,b), 4.3.7(a,b), 4.3.9(a,b), 4.3.11(a,b).**

1. In Homework 4, we saw data from the Hudson Bay Company on the number of hare pelts (in thousands) collected from 1900 to 1910 and interpolated the data with Lagrange polynomials. The time in the first row is the number of years after 1900. Now we would like to find the rate of change of the population using these data.

Year	0	1	2	3	4	5	6	7	8	9	10
Pelts	30	47.2	70.2	77.4	36.3	20.6	18.1	21.4	22	25.4	27.1

a. Use the most accurate 3-point formula to predict the rate of change (derivative) of the population at each of the times listed. When is the population growing most rapidly and when is it declining most rapidly.

b. Use the Lagrange polynomial that you found in Homework 4 to compute the derivative at each of the years above. From this calculation, when is the population growing most rapidly and when is it declining most rapidly.

c. Compare these to your results in Part a. Which technique gives a better approximation to the rate of change of the hare population?