ASE 211 Homework 10

Due: 12:00 noon, Friday, Nov 10.

1. Consider the function $f(x) = 3x^{2.5}\cos(x^2)$. Compute the derivative of f at $x = \sqrt{\pi}$ analytically. Compute the forward difference approximation to $f'(\sqrt{\pi})$ for $h = .1$, $.05$ and $.025$, and show that the error is going to zero like h. Compute the central difference approximation and show that the error is going to zero like h^2.

2. A rocket flying straight upward during launch sends back the following velocity data:

t (sec)	v(t) (m/s)
.5	5.1
1.5	8.9
2.8	16.9
3.1	18.1
4.0	27.9
5.5	34.3
6.2	35.1
6.5	35.5
7.0	38.1
8.2	39.2

Using your spline code from previous assignments, plot the acceleration function $a(t) = v'(t)$ from $t = 0$ to $t = 8.2$, obtained by differentiating the spline interpolant of the velocity data.