HW 10 Solutions

§4.7 #1,2   §4.12 #6

§4.7 #1. $f(x) = \cos\frac{\pi}{2}x$ nodes $= 0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1$

$$P_2(x) = \begin{cases} 1 - .30448x - 1.1252x(x-.25) & 0 \le x \le .5 \\[2ex] \frac{\sqrt{2}}{2} - 1.2977(x-.5) - .4661(x-.5)(x-.75) & .5 \le x \le 1 \end{cases}$$

plot in Matlab

#2. $f(x) = \sqrt{x}$ $x = [.2 \quad .4 \quad .6 \quad .8 \quad 1]$

$$P_2(x) = \begin{cases} .44721 + .92621(x-.2) - .53876(x-.2)(x-.4) & .2 \le x \le .6 \\[2ex] \sqrt{.6} + .5992(x-.6) - .1782(x-.6)(x-.8) & .6 \le x \le 1 \end{cases}$$

§4.12 #6 $f(x) = e^x$ on $[-1,1]$

See MATLAB Solution online.   3 points

You will see that the error is minimized by choosing the Chebychev nodes. Numerical error begins to crop up too, as the degree gets larger.