P517.

#3. $x_0 = \cos\frac{\pi}{8} = 0.92$

$x_1 = \cos\frac{3}{8}\pi = 0.38$

$x_2 = \cos\frac{5}{8}\pi = -0.38$

$x_3 = \cos\frac{7}{8}\pi = -0.92$

i	0	1	2	3
x_i	0.92	0.38	-0.38	-0.92
e^x	2.52	1.47	0.68	0.40
$\sin x$	0.02	6.68×10^{-3}	-6.68×10^{-3}	-0.02
$\ln(x+2)$	1.07	0.87	0.48	0.07
x^4	0.73	0.02	0.02	0.73

~~$f[x_0,x_1]=$~~

	$f[x_0,x_1]$	$f[x_1,x_2]$	$f[x_2,x_3]$	$f[x_0,x_1,x_2]$	$f[x_1,x_2,x_3]$	$f[x_0,x_1,x_2,x_3]$
e^x	1.94	1.03	0.52	0.70	0.39	0.17
$\sin x$	0.78	0.97	0.78	-0.14	0.15	-0.15
$\ln(x+2)$	0.37	0.51	0.76	-0.11	-0.19	0.04
x^4	1.31	0	-1.31	1.00	1.01	0

(a) $P(x) = 2.51 + 1.94(x-0.92) + 0.7(x-0.92)(x-0.38) + 0.17(x-0.92)(x-0.38)(x+0.38)$

(b) $P(x) = 0.79 + 0.78(x-0.92) - 0.14(x-0.92)(x-0.38) - 0.15(x-0.92)(x-0.38)(x+0.38)$

(c) $P(x) = 1.07 + 0.37(x-0.92) + (-0.11)(x-0.92)(x-0.38) + 0.04(x-0.92)(x-0.38)(x+0.38)$

(d) $P(x) = 0.73 + 1.31(x-0.92) + (x-0.92)(x-0.38)$

#7.

$f_1(x) = x - \frac{x^3}{6} + \frac{x^5}{120}$ $\quad T_5 = 16x^5 - 20x^3 + 5x$

$Q_5(x) = \frac{1}{120}(x^5 - \frac{5}{4}x^3 + \frac{5}{16}x)$

$f_2(x) = f_1(x) - Q_5(x) = \frac{383}{384}x - \frac{5}{32}x^3 \quad \therefore \|\sin x - f_2(x)\|_\infty \approx 7.2\times10^{-4}.$

#9 $\int_{-1}^{1} \frac{T_n^2(x)}{\sqrt{1-x^2}}\,dx = \int_{\pi}^{0} -\cos^2 n\theta\, d\theta = \frac{\pi}{2} + \left(\frac{1}{4n}\sin 2n\theta\right)\Big|_0^{\pi} = \frac{\pi}{2}$

P176. #7.

$h=1.\quad f'(3)=\frac{1}{12}[f(1)-8f(2)+8f(4)-f(5)]=0.2106167.$

$E_r=\max_{1\le x\le 5}\frac{|f^{(5)}(x)|\cdot h^4}{30}\le\frac{23}{30}=0.7667.$

P177. #13.

$h=\frac{1}{4}.\quad \hat{f}''(0.5)=16[f(\frac{1}{4})-2f(\frac{1}{2})+f(0.75)]=0.$

$f''(0.5)=-\pi^2\cos\pi\cdot 0.5=0$

$\therefore E_r=|\hat{f}''(0.5)-f''(0.5)|=0.$ $f(x)$ is symmetric at $x=0.5.$

$\delta=\frac{h^2}{12}|f^{4}(\xi)|_{max}=0.358743$