Antonios Vandoulakis

Mat 1575

Calc 2

Test #2 review

Find the taylor polynomial of degree $n=4$ for x near the point $a=\frac{\pi}{8}$ for the function $(\sin(4x))$

Given $f(x)=\sin(4x)$, at $a=\frac{\pi}{8}$

$$f'(x)=4\cos(4x)$$

$$f''(x)=-4^2\sin(4x)$$

$$f'''(x)=-(4)^3\cos(4x)$$

$$f^{IV}(x)==4^4\sin(4x)$$

$$f(a)=\sin\left(4\cdot\frac{\pi}{8}\right)=1$$

$f'(a)=0$ $\quad f''(a)=-4^2$, $f'''(a)=0$, $f^{IV}(a)=4^4$

the taylor poly at $n=4$ at $x=a$ would be

$$P_4(x)=f(a)+\frac{x-a}{1!}f'(a)+\left(\frac{(x-a)^2}{2!}\right)f''(a)+\frac{(x-a)^3}{3!}f'''(a)+\frac{(x-a)^4}{4!}f^4(a)$$

$$P_4(x)=f(\pi/8)+\frac{x-\frac{\pi}{8}}{1!}f'\left(\frac{\pi}{8}\right)+\frac{\left(x-\frac{\pi}{8}\right)^2}{2!}f''\left(\frac{\pi}{8}\right)+\frac{\left(x-\frac{\pi}{8}\right)^3}{3!}f'''\left(\frac{\pi}{8}\right)+\frac{\left(x-\frac{\pi}{8}\right)^4}{4!}f^4\left(\frac{\pi}{8}\right)$$

$$=1+0+\frac{(x-\pi/8)^2}{2!}\times\left(-(4)^2\right)+0+\frac{(x-\pi/8)^4}{4!}\times(4)^4$$

$$P^4(x)=1-8\left(x-\frac{\pi}{8}\right)^2+\frac{32}{3}\left(x-\frac{\pi}{8}\right)4$$