Ken Mei 11/27/22 Test #2 Review Lesson #11

Webwork - Series - Taylor and Maclaurin Polynomials: Problem #4

Find the second-degree Taylor Polynomial for $f(x) = 5x^2 - 9x + 8$ about $x = 0$

$$P_N(x) = \sum_{n=0}^{N} \frac{f^{(n)}}{n!}(x-a)^n$$

$$= f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \frac{f'''(a)}{3!}(x-a)^3 + \ldots + \frac{f^{(N)}(a)}{N!}(x-a)^N$$

$f(x) = 5x^2 - 9x + 8$ $\quad f(0) = 5(0)^2 - 9(0) + 8 = 8$

$f'(x) = 10x - 9$ $\quad f'(0) = 10(0) - 9 = -9$

$f''(x) = 10$ $\quad f''(0) = 10$

$$T_2(x) = 8 - 9(x-0) + \frac{10}{2!}(x-0)^2$$

$$\boxed{T_2(x) = 8 - 9x + 5x^2}$$

Webwork - Series - Taylor and Maclaurin Polynomials: Problem #5

$\frac{d}{dx} e^x = e^x$

Write the Taylor polynomial $T_5(x)$ for the function $f(x) = e^x$ centered at $x = 0$

$f(x) = e^x$ $\quad f(0) = 1$

$f'(x) = e^x$ $\quad f'(0) = 1$

$f''(x) = e^x$ $\quad f''(0) = 1$

$f'''(x) = e^x$ $\quad f'''(0) = 1$

$f^{(4)}(x) = e^x$ $\quad f^{(4)}(0) = 1$

$f^{(5)}(x) = e^x$ $\quad f^{(5)}(0) = 1$

$$T_5(x) = 1 + 1(x-0) + \frac{1}{2}(x-0)^2 + \frac{1}{3!}(x-0)^3 + \frac{1}{4!}(x-0)^4 + \frac{1}{5!}(x-0)^5$$

$$\boxed{T_5(x) = 1 + 1x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5}$$