PERTEMUAN 4

TUGAS PRAKTIKUM

1. Gunakan deret taylor untuk mengaproksimasi fungsi

$$f(x) = \frac{1}{x^2}$$

di sekitar x = -1

Deret taylor utk mengaproksimasi fungsi $f(x) \frac{1}{x^2}$ disekitar $x = -1$

$f^{(0)}(x) = \frac{1}{x^2}$ $\quad$ $f^{(0)}(-1) = \frac{1}{(-1)^2} = 1$

$f^{(1)}(x) = -\frac{2}{x^3}$ $\quad$ $f^{(1)}(-1) = -\frac{2}{(-1)^3} = 2$

$f^{(2)}(x) = \frac{2(3)}{x^4}$ $\quad$ $f^{(2)}(-1) = \frac{2(3)}{(-1)^4} = 2(3)$

$f^{(3)}(x) = \frac{2(3)(4)}{x^5}$ $\quad$ $f^{(3)}(-1) = -\frac{2(3)(4)}{(-1)^5} = 2(3)(4)$

$f^{(n)}(x) = \frac{(-1)^n (n+1)!}{x^{n+2}}$

$f^{(n)}(-1) = \frac{(-1)^n (n+1)!}{(-1)^{n+2}} = (n+1)!$

$$\frac{1}{x^2} = \sum_{n=0}^{\infty} \frac{f^{(n)}(-1)}{n!} (x+1)^n$$

$$= \sum_{n=0}^{\infty} \frac{(n+1)!}{n!} (x-1)^n = \sum_{n=0}^{\infty} (n+1)(x+1)^n$$

2. Aproksimasi fungsi berikut menggunakan deret McLaurin.

$$f(x) = e^{x^2}$$

No.

Aproksimasi fungsi berikut menggunakan deret McLaurin

$$f(x) = e^{x^2}$$

$f(x) = e^{x^2}$	
$f^0(x) = e^{x^2}$	$f^0(0) = e^{0^2} = 1$
$f'(x) = 2xe^{x^2}$	$f'(0) = 2.0\,e^{0^2} = 0$
$f^2(x) = (4x^2+2)e^{x^2}$	$f^2(0) = (4.0^2+2)\,e^{0^2} = 2$
$f^3(x) = 4x(2x^2+3)e^{x^2}$	$f^3(0) = 4.0(2.0^2+3)\,e^{0^2} = 0$
$f^4(x) = (16x^4+48x^2+12)e^{x^2}$	$f^4(0) = (16.0^4+48.0^2+12)\,e^{0^2} = 12$
$f^5(x) = 8x(4x^4+20x^2+15)e^{x^2}$	$f^5(0) = 8.0(4.0^4+20.0^2+15)\,e^{0^2} = 0$
$f^6(x) = (64x^6+480x^4+720x^2+120)e^{x^2}$	$f^6(0) = (64.0^6+480.0^4+720.0^2+120)e^{0^2} = 120$

$$f(x) = \frac{1x^0}{0!} + \frac{0x^1}{1!} + \frac{2x^2}{2!} + \frac{0x^3}{3!} + \frac{12x^4}{4!} + \frac{0x^5}{5!} + \frac{120x^6}{6!} + \dots$$

$$f(x) = 1 + x^2 + \frac{1}{2}x^4 + \frac{1}{6}x^6 + \dots$$

$$f(x) = 1 + x^{1(2)} + \frac{1}{2!}x^{2(2)} + \frac{1}{3!}x^{3(2)} + \dots$$

Sehingga untuk $f(x) = \frac{1}{(n-1)!}x^{2(n-1)} \rightarrow f(x) = \sum_{n=0}^{\infty} \frac{x^{2n}}{n!}$