(1) write $f(x) = \frac{2}{1+x^3}$ in sum form

Given GCO

$$\sum_{n=0}^{\infty} (-1)^n (2)(x^{3n})$$

(1) $f(2) = 3$

$f'(2) = 1$

$f''(2) = 6$

$f'''(2) = -4$

Taylor at $x = 2$

$$3 + (x-2) + \frac{6(x-2)^2}{2} - \frac{4(x-2)^3}{3!}$$

$$3 + (x-2) + 3(x-2)^2 - \frac{2(x-2)^3}{3}$$

(1) $\sum_{n=0}^{\infty} \frac{(-1)^n 3x^n}{5(2)^n}$ Given Geometric

$$\frac{\frac{3}{5}}{1 + \frac{x}{2}}$$

$$\frac{6}{10 + 5x}$$

$-2 < x < 2$

Find $f(x)$ on interval

(2) Approx $\tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$ using 1st 3 term of Maclaurin. (3 deci places)

$\frac{\sqrt{3}}{3} - \frac{\left(\frac{\sqrt{3}}{3}\right)^3}{3} + \frac{\left(\frac{\sqrt{3}}{3}\right)^5}{5}$

$= \boxed{.526}$

(2) Find 1st 4 Term. Maclaurin

$f(x) = \frac{e^x + e^{-x}}{2}$

$\boxed{1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!}}$

$\frac{1}{2}\left( 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} \cdots \right.$

$\left. + 1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} \cdots \right)$

(2) $f(x) = -x + \sin x$

Find Maclaurin in sum form

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

$\frac{-x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!}$

$\boxed{\sum_{n=0}^{\infty} \frac{(-1)^{n+1} x^{2n+3}}{(2n+3)!}}$

(2) $f(x) = \frac{1}{2x+1}$ 2nd order Taylor at $x = 2$

$\frac{1}{5} - \frac{2}{25}(x-2) + \frac{8}{125}\frac{(x-2)^2}{2}$

$\boxed{\frac{1}{5} \frac{-2(x-2)}{25} + \frac{8(x-2)^2}{250}}$ $\frac{4}{125}$

(2) $f(3) = 5$

$f'(3) = -2$

$f''(3) = 6$

$f'''(3) = -3$

Given $f^{iv}(x) \leq 6$ Find Lagrange error bound of 3rd order Taylor on $[2.9 \leq x \leq 3.1]$

$\frac{6(.1)^4}{4!}$

exact

$= \boxed{.000025}$

(2) $f(x) = x^3 - 3x^2 + 2x + 1$

Approx $f(2.1)$ using 2nd order Taylor at $x = 2$

$f(2) = 1$
$f'(2) = 2$
$f''(2) = 6$

$1 + 2(x-2) + \frac{6(x-2)^2}{2}$

$\boxed{1.23}$

(3) Find sum

$$1 - \frac{(\frac{\pi}{3})^2}{2!} + \frac{(\frac{\pi}{3})^4}{4!} - \frac{(\frac{\pi}{3})^6}{6!} + \cdots$$

$\frac{1}{2}$

(2) Find 1st 3 Terms Maclaurin

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

$4x + 4x^2 + 4x^3$

(3) $f(x) = \ln x$

Find Lagrange Error

of 4th order Taylor at $x = 2$

on $[1.5, 2.5]$

$$R_5(x) = \frac{\frac{24}{1.5^5}(.5)^5}{5!}$$

$= .000823$

$f^v(x) = 24x^{-5}$ $\quad M = \frac{24}{1.5^5} =$

(3) $f(x) = \cos(x^2)$

$g'(x) = f(x)$

$g(0) = 3$

Find 1st 4 Taylor at $x = 0$

of $g(x)$

$\cos(x)$ $\quad 1 - \frac{x^2}{2!} + \frac{x^4}{4!}$

$\cos(x^2)$ $\quad 1 - \frac{x^4}{2!} + \frac{x^8}{4!}$

$\int \cos(x^2) \cdot x - \frac{x^5}{5 \cdot 2!} + \frac{x^9}{9 \cdot 4!}$

$3 + x - \frac{x^5}{10} + \frac{x^9}{216}$

(3) Give Maclaurin for $f(x)$

$= 3x^2 - 2x^3 + 4x^4 - 2x^5 \cdots$

find $f^{iv}(0)$

$\frac{f^{iv}(0)\,x^4}{4!} = 4x^4$

$\frac{f^{iv}(0)}{4!} = 4$ $\quad f^{iv}(0) = 96$