Scribe

a)

* Para el conjunto soporte $\Omega = \{(X_0, f(X_0)),$
$(X_1, f(X_1)), (X_1, f(X_1)), (X_2, f(X_2))\}$, calcule
el polinomio de interpolación de grado 2.

Con un error promedio $E = |f(X) - P(X)|$

El polinomio se construye a partir de

$$P_n(X) = \sum_{i=0}^{n} f(X_i) L_i(X)$$

$$\rightarrow P_2(X) = f(X_0) L_0(X) + f(X_1) L_1(X) + f(X_2) L_2(X)$$

En donde $L_0 = \frac{X - X_1}{X_0 - X_1} \cdot \frac{X - X_2}{X_0 - X_2}$; $L_i = \prod_{j=0, j \neq i}^{n} \frac{X - X_j}{X_i - X_j}$

$$= \frac{X^2 - (X_1 + X_2)X + X_1 X_2}{\underbrace{X_0^2 - X_0(X_1 + X_2) + X_1 X_2}_{\text{Valor real}}}$$

$$\rightarrow L_1 = \frac{X^2 - (X_0 + X_2)X + X_0 X_2}{X_1^2 - X_1(X_0 + X_2) + X_0 X_2}$$

$$L_2 = \frac{X^2 - (X_0 + X_1)X + (X_0 X_1)}{X_2^2 - X_2(X_0 + X_1) + X_0 X_1}$$

$\rightarrow P_2(X)$ b) Derive el polinomio

$$= f(X_0)\frac{X^2-(X_1+X_2)X+X_1X_2}{X_0^2-X_0(X_1+X_2)+X_1X_2} + f(X_1)\frac{X^2-(X_0+X_2)X+X_0X_2}{X_1^2-X_1(X_0+X_2)+X_0X_2}$$

$$+ f(X_2)\frac{X^2-(X_0+X_1)X+X_0X_1}{X_2^2-X_2(X_0+X_1)+X_0X_1}$$

Derivar $P(X) \rightarrow P'(X)$

$\rightarrow$

$$= \frac{f(X_0)}{X_0^2-X_0(X_1+X_2)+X_1X_2}(2X-(X_1+X_2)) + \frac{f(X_1)}{X_1^2-X_1(X_0+X_2)+X_0X_2}(2X-(X_0+X_2))$$

$$+ \frac{f(X_2)}{X_2^2-X_2(X_0+X_1)+X_0X_1}(2X-(X_0+X_1))$$

e) $f(x) = (\tan(x))^{1/2}$

$\rightarrow f'(x) = \frac{1}{2}(\tan(x))^{-1/2} \sec^2(x)$

$= \frac{1 \sec^2(x)}{2\sqrt{\tan(x)}}$

Estimacion central

Para $h << 1$

$f'(x) = \frac{f(x+h) - f(x-h)}{2h} \simeq$

$f(x_i) = \frac{f(x_{i+1}) - f(x_{i-1})}{2h}$ Orden $O(h^2)$

Estimacion Progresiva:

$f'(x_i) \cong \frac{f(x_{i+1}) - f(x_i)}{h} - \frac{h}{2} f''(x_i)$ Orden $O(h^2)$