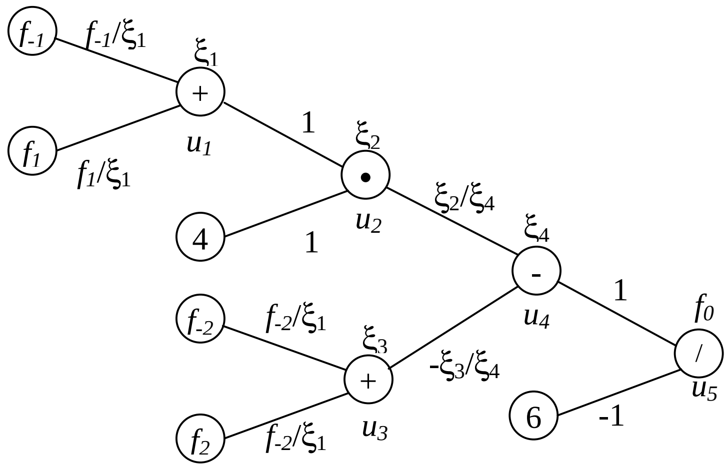
18)

$$f_0 = \frac{4(f_{-1}+f_1)-(f_{-2}+f_2)}{6}$$ $x_{-2} = -2$; $x_{-1} = -1$; $x_1 = 1$; $x_2 = 2$

a) error en $f_i : \delta f_i$, i = -2, -1 , 1 , 2
$r_i \equiv \delta f_i \,/\, f_i$



$$\xi_1 = f_{-1} + f_1$$
$$\xi_2 = 4\xi_1$$
$$\xi_3 = f_{-2} + f_2$$
$$\xi_2 = \xi_2 - \xi_3$$
$$f_0 = \frac{\xi_4}{6}$$

$$r_{f_0} = \left(\frac{f_{-1}}{\xi_1}.r_{-1} + \frac{f_1}{\xi_1}.r_1 + u1 + u2\right)\frac{\xi_2}{\xi_4} - \left(\frac{f_{-2}}{\xi_3}.r_{-2} + \frac{f_2}{\xi_3}.r_2 + u3\right).\frac{\xi_3}{\xi_4} + u4 + u5$$

$$\left|r_{f_0}\right| \le \left(\left|\frac{f_{-1}}{\xi_1}\right|.R_{-1} + \left|\frac{f_1}{\xi_1}\right|.R_1\right)\left|\frac{\xi_2}{\xi_4}\right| + \left(\left|\frac{f_{-2}}{\xi_3}\right|.R_{-2} + \left|\frac{f_2}{\xi_3}\right|.R_2\right)\left|\frac{\xi_3}{\xi_4}\right| + \left(2\left|\frac{\xi_2}{\xi_4}\right| + \left|\frac{\xi_3}{\xi_4}\right| + 2\right).u = R_{f_0}$$

Notando que $|\xi_2| = 4.|\xi_1|$ y $|\xi_4| = 6.|f_0|$

$$R_{f_0} = \frac{4}{6}\left|\frac{f_{-1}}{f_0}\right|R_{-1} + \frac{4}{6}\left|\frac{f_1}{f_0}\right|R_1 + \frac{1}{6}\left|\frac{f_{-2}}{f_0}\right|R_{-2} + \frac{1}{6}\left|\frac{f_2}{f_0}\right|R_2 + \left(\frac{4}{3}\frac{|f_{-1}+f_1|}{|f_0|} + \frac{1}{6}\frac{|f_{-2}+f_2|}{|f_0|} + 2\right).u$$

Si Δf es el error absoluto de $f_i \Rightarrow R_i = \Delta f \,/\, |f_i|$

b) F par $\Rightarrow$ $f_{-1} = f_1$, $f_{-2} = f_2$

$|f_1| \sim |f_2| \sim |f_0| \Rightarrow R_1 \sim R_2 \equiv R$

Entonces: $\boxed{R_{f_0} = \frac{10}{6}R + 5u = \frac{5}{3}R + 5u}$

Error de redondeo despreciable si $\frac{5}{3}R \gg 5u \quad \Rightarrow \boxed{u \ll \frac{R}{3}}$

Enfatizar que esto es, en general, lo que se busca en la práctica: que los errores debido al redondeo en las operaciones sean despreciables frente a los debidos a los errores de entrada.