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CSE 330
Section 17
Assignment 03

Fortward difference =
$$\frac{f(x+h) - f(x)}{h}$$

= $\frac{f(1.0+0.1) - f(1.0)}{0.1}$
= $\frac{f(1.1) - f(1)}{0.1}$
= $\frac{1.0484}{1}$

Central disserence =
$$\frac{5(x+h) - 5(x-h)}{2h}$$
=
$$\frac{5(1+0.1) - 5(1-0.1)}{2 \times 0.1}$$
=
$$\frac{5(1.1) - 5(0.9)}{0.2}$$
=
$$\frac{5.99833}{0.2}$$

b)
$$f(x) = x \cdot \frac{1}{x} + \ln x \cdot 1 = 1 + \ln x$$

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

The upper bound of Anuncation evolution,

for backward difference = $\frac{5''(3)h}{2!}$ = $\frac{0.1}{2 \times 0.91}$ = 0.05 = 55

Son central dissenence = $\frac{5'''(3)h^2}{3!}$ = $\frac{(0.1)^2}{6 \times (0.9)^2} (1.1)^2$ = 0.0013774

 $Dh = \frac{5'(\alpha)}{3!} + \frac{\frac{5^{3}(\alpha)}{3!}}{3!} + \frac{\frac{5^{5}(\alpha)}{5!}}{5!} + \frac{5^{5}(\alpha)}{5!} + \frac{4h}{3})^{4} + 0(h^{6})$ $D_{4h/3} = \frac{5'(\alpha)}{3!} + \frac{\frac{5^{3}(\alpha)}{3!}}{3!} (\frac{4h}{3})^{2} + \frac{\frac{5^{5}(\alpha)}{5!}}{5!} (\frac{4h}{3})^{4} + 0(h^{6})$ $\frac{3}{16} D_{4h/3} - D_{h} = -\frac{7}{16} \frac{5^{1}(\alpha)}{5!} + 0 + (\frac{\frac{5^{5}(\alpha)}{5!}}{5!} \frac{\frac{16h^{4}}{9} - \frac{5^{5}(\alpha)}{5!}}{5!} + \frac{4}{9})$ $+ 0(4h^{6})$ $\frac{2}{16} D_{4h/3} - D_{h} = \frac{5^{1}(\alpha)}{-7/16} + \frac{\frac{5^{5}(\alpha)}{5!}}{-7/16} + \frac{4}{9} + \frac{16h^{4}}{-7/16} + \frac{16h^{4}}{-7/1$

 $...D^{1}_{h} = \frac{16}{7}D_{h} - \frac{9}{7}D_{4h/3}$

Am no 2

Central Difference =
$$\frac{5(x+h)-5(x-h)}{2h}$$

= $\frac{5(1\cdot2+0\cdot1)-5(1\cdot2-0\cdot1)}{2\times0\cdot1}$
= $\frac{5(1\cdot3)-6(1\cdot1)}{0\cdot2}$
= $\frac{0\cdot01131-0\cdot2902}{0\cdot2}$
= $\frac{0\cdot01131-0\cdot2902}{0\cdot2}$
= $-1\cdot394$
 $5(x) = 2\cos(x)-x+\sin(x)$
 $5'(x) = -2\sin x + \cos x - 1 + \cos x$
= $-x\sin x + 2\cos x - 1$
 $5'(1\cdot2) = -1\cdot2\sin(1\cdot2) + 2\cos(1\cdot2) - 1$
= $\frac{0\cdot9744}{1\cdot394} - \frac{1\cdot394}{1\cdot394} = \frac{$

b)
$$D_{0:2} = \frac{16D_{0:2} - D_{0}}{15}$$

$$D_{0:2} = -1.0088 \times 10^{10}$$

$$D_{0:1} = -1.1025 \times 10^{10}$$

$$D_{0:05} = \frac{5(2.7 + 6.05) - 5(2.7 - 0.05)}{2 \times 0.05}$$

$$= \frac{5(2.7 + 5) - 4(2.65)}{6.1}$$

$$= \frac{4(2.75)^{3} - 9e^{7(2.75)} - (4(2.65)^{3} - 9e^{7(2.75)})}{6.1}$$

$$= \frac{-2062582215 + 1024247983}{0.1}$$

$$= -1.038 \times 10^{10}$$

$$D_{0:1} = \frac{4D_{0:05} - D_{0:1}}{3}$$

$$= -3.0508 \times 10^{10}$$

$$D_{0:2}^{2} = \frac{16 \times (-1.0169 \times 10^{10}) + 1.0088 \times 10^{10}}{15}$$

= -1.017 ×1010 = (4 € sig sigure)