

Correccion Quiz

Quiz #1 - Punto Flotante

7. a) -4.59458739_{10}

Precision = 16 bits

Exponente = 4 bits

Paso 1

$$4/2 = 2$$

$$2/2 = 1$$

$$1/2 = 0$$

$$0.59458739 \times 2 = 1$$

$$0.18917478 \times 2 = 0$$

$$0.37834956 \times 2 = 0$$

$$0.75669912 \times 2 = 1$$

$$0.51339824 \times 2 = 1$$

$$0.02679648 \times 2 = 0$$

$$0.05359296 \times 2 = 0$$

$$0.10718592 \times 2 = 0$$

$$0.21437184 \times 2 = 0$$

$$0.42874368 \times 2 = 0$$

$$0.85748736 \times 2 = 1$$

Paso 2

$$100.10011000001 = 1.0010011000001 \times 2^2$$

Paso 3.

$$\text{bias} = 2^{4-1} - 1 = 7$$

$$\begin{array}{r} 9 \text{ bits} \\ 1 \text{ bit} \\ 0 \text{ bit} \\ 0 \text{ bit} \end{array}$$

Paso 4.

$$\text{Exp} = 2 + 7 = 9 = 1001_2$$

$$\begin{array}{c} S \quad E \quad M \\ 1 \quad 1 \quad 0 \quad 0 \quad 1 \quad 0 \quad 0 \quad 1 \quad 1 \quad 0 \quad 0 \quad 0 \quad 0 \quad 1 \end{array}$$

$$b) \text{ Value} = (-1)^1 \left(1 + \sum_{i=1}^n 0(11-i)2^{-i} \right) \times 2^{E-7}$$

$$-1 \left(1 + 2^{-3} + 2^{-6} + 2^{-7} \right) \times 2^{9-7} = -4.59375$$

$$K_p = \frac{|P - \hat{P}|}{|P|} = \frac{-4.59458739 - (-4.59375)}{-4.59458739} = 1.82256 \times 10^{-4}$$

8. 4.29459816₁₀

Precision = 16 bits

Exp = 3 bits

$$4_{10} = 100_2$$

$$0.29459816 \times 2 = 0$$

$$0.83475777 \times 2 = 1$$

$$0.58919632 \times 2 = 1$$

$$0.17839264 \times 2 = 0$$

$$0.35678528 \times 2 = 0$$

$$0.71357056 \times 2 = 1$$

$$0.42714112 \times 2 = 0$$

$$0.85428224 \times 2 = 1$$

$$0.70856448 \times 2 = 1$$

$$0.41712896 \times 2 = 0$$

$$100.01001011 = 1.0001001011 \times 2^3$$

$$\text{bias} = 2^{3-1} - 1 = 3$$

$$\text{Exp} = 2 + 3 = 5 = 101_2$$

$$\begin{array}{r} 5 \div 2 = 2 \text{ R } 1 \\ 2 \div 2 = 1 \text{ R } 0 \\ 1 \div 2 = 0 \text{ R } 1 \\ \hline 101 \end{array}$$

$$\begin{array}{c|c|c} S & E & M \\ \hline 0 & 101 & 0001001011 \end{array}$$

$$\text{Value} = (-1)^0 \left[1 + 2^{-4} + 2^{-7} + 2^{-9} + 2^{-10} + 2^{-12} \right] \times 2^2 = 4.293945313$$

$$\text{RP} = \left| \frac{P - \hat{P}}{P} \right| = 1.52016 \times 10^{-4}$$

9. -71.10369740₁₀

Precision = 16

exp = 4 bits

$$71 / 2 = 1$$

$$0.10369740 \times 2 = 0$$

$$35 / 2 = 1$$

$$0.2073948 \times 2 = 0$$

$$17 / 2 = 1$$

$$0.4147896 \times 2 = 0$$

$$8 / 2 = 0$$

$$0.8295792 \times 2 = 1$$

$$4 / 2 = 0$$

$$0.6591584 \times 2 = 1$$

$$2 / 2 = 0$$

$$1 / 2 = 1$$

$$1000111.00011 = 100011100011 \times 2^6$$

$$\text{bias} = 2^{4-1} - 1 = 7$$

$$\text{Exp} = 6 + 7 = 13 = 1101_2$$

$$\begin{array}{c|c|c} S & E & M \\ \hline 1 & 1101 & 00011100011 \end{array}$$

$$13 / 2 = 1$$

$$6 / 2 = 0$$

$$3 / 2 = 1$$

$$1 / 2 = 1$$

$$b) (-1)^1 \left[1 + z^{-4} + z^{-5} + z^{-6} + z^{-10} + z^{-11} \right] z^6 = -71.09375$$

$$R_p = \left| \frac{P - \hat{P}}{P} \right| = 1.39899 \times 10^{-4}$$

10. 7.98769552_{10}

Precision = 16 bits 3 bits

$$7/2 = 1$$

$$3/2 = 1$$

$$1/2 = 1$$

$$111.1111110011$$

$$1.111111110011 \times 2^2$$

$$\text{bias} = 2^{3-1} - 1 = 3$$

$$\text{Exp} = 2 + 3 = 5 = 101_2$$

S	E	M
0	101	111111110011

$$(-1)^0 \left[1 + z^{-1} + z^{-2} + z^{-3} + z^{-4} + z^{-5} + z^{-6} + z^{-7} + z^{-8} + z^{-11} + z^{-12} \right] z^2$$

$$= 7.987304688$$

$$R_p = \left| \frac{P - \hat{P}}{P} \right| = 4.90544 \times 10^{-5}$$

11. -9.60458915_{10}

Precision = 16 bits Exp = 4

$$9/2 = 1$$

$$4/2 = 0$$

$$2/2 = 0$$

$$1/2 = 1$$

$$0.60458915 \times 2 = 1$$

$$0.7091743 \times 2 = 0$$

$$0.4183480 \times 2 = 0$$

$$0.8366960 \times 2 = 1$$

$$0.6733944 \times 2 = 1$$

$$0.3467888 \times 2 = 0$$

$$0.6935776 \times 2 = 1$$

$$0.3871552 \times 2 = 0$$

$$1001.10011010 = 1.00110011010 \times 2^3$$

$$\text{bias} = 2^{4-1} - 1 = 7$$

$$\text{Exp} = 7 + 3 = 10 = 1010_2$$

S	E	M
1	1010	00110011010

$$(-1) \left[1 + 2^{-3} + 2^{-4} + 2^{-5} + 2^{-6} + 2^{-7} + 2^{-8} + 2^{-9} + 2^{-10} \right] \times 2^3 = -9.6015625$$

$$R_r = \left| \frac{p - \hat{p}}{\hat{p}} \right| = 3.19919 \times 10^{-4}$$

12. 2891.078129,0

Perimeter = 32 m

$$C_{10} = 8$$

$$2891 / 2 = 1$$

$$1445 \div 3 =$$

$$727 \div 2 = 3$$

$$361 / 2 = 1$$

$$180 / 2 = 90$$

$$90 \quad 1 \quad 2 \quad 3 \quad 0$$

$$451 \cdot 2 = 1$$

$$22 \mid 2 = 0$$

$$11 \mid 2 = 1$$

$$51 \quad 2 \quad = \quad 1$$

21 2 2 0

$$1/2 = 1$$

$$0.078125 \times 2 = 0$$

$$O. 1367S \quad XZ = O$$

$0.3125 \times 2 = 0.625$

$0.625 \times 2 = 1.25$

$$0.75 \times 2 = 1.5$$

$$1 = 2x \cdot 5.05$$

101101001011, 000101

1.011010010100101

$$\text{bias} = 177$$

$$Exp = 11 + 127 = 138$$

$$138 / 2 = 69$$

$$6912 = 1$$

$$3412 = 0$$

$$1712 = 1$$

$$0 = 2/8$$

$$4/2 = 0$$

$$712 = 0$$

$$112 = 1$$

[illegible]

13. $\begin{matrix} S_1 & & C & & M \\ 1101010110011000100000100010 \end{matrix}$

Ex. 7, $2^5 + 2^5 + 2^0 + 2^0 = 56$

$$(-1)^1 \left[2^{-2} + 2^{-3} + 2^{-6} + 2^{-7} + 2^{-11} + 2^{-18} + 2^{-22} \right] \times 2^{-74} = 2.111916958 \times 10^{-11}$$

14. 7954.09 32 bits Exp = 8 (2005-10)

$$\begin{aligned}
 7954 / 2 &= 0 \\
 3977 / 2 &= 1 \\
 1988 / 2 &= 0 \\
 994 / 2 &= 0 \\
 497 / 2 &= 1 \\
 248 / 2 &= 0 \\
 124 / 2 &= 0 \\
 62 / 2 &= 0 \\
 31 / 2 &= 1 \\
 15 / 2 &= 1 \\
 7 / 2 &= 1 \\
 3 / 2 &= 1 \\
 1 / 2 &= 1
 \end{aligned}$$

$$\begin{aligned}
 0.09 \times 2 &= 0 \\
 0.18 \times 2 &= 0 \\
 0.36 \times 2 &= 0 \\
 0.72 \times 2 &= 1 \\
 0.44 \times 2 &= 0 \\
 0.88 \times 2 &= 1 \\
 0.76 \times 2 &= 1 \\
 0.52 \times 2 &= 1 \\
 0.04 \times 2 &= 0 \\
 0.08 \times 2 &= 0 \\
 0.16 \times 2 &= 0 \\
 0.32 \times 2 &= 0 \\
 0.64 \times 2 &= 1
 \end{aligned}$$

1111100010010.0001011000

1.111100010010001011000 $\times 2^{12}$

$$\text{Exp} = 12 + 12 = 139$$

$$\begin{aligned}
 139 / 2 &= 1 \\
 69 / 2 &= 1 \\
 34 / 2 &= 0 \\
 17 / 2 &= 1 \\
 8 / 2 &= 0 \\
 4 / 2 &= 0 \\
 2 / 2 &= 0 \\
 1 / 2 &= 1
 \end{aligned}$$

S E M
 0 1 000 1 0 1 1 1 1 1 000 1 0 0 1 000 1 0 1 1 000

15. 1001101110010001000100000100001

$$\text{Exp} = 2^5 + 2^4 + 2^3 + 2^1 + 2^0 = 55$$

$$(-1)^1 \left(1 + 2^{-3} + 2^{-7} + 2^{-11} + 2^{-15} + 2^{-19} \right) \times 2^{-72} = -2.399249095 \times 10^{-22}$$

16. 6317.9135₁₀

32 bits

exp

bias = 129

$$6317 / 2 = 1$$

$$3158 / 2 = 0$$

$$1579 / 2 = 1$$

$$789 / 2 = 1$$

$$394 / 2 = 0$$

$$197 / 2 = 1$$

$$98 / 2 = 0$$

$$49 / 2 = 1$$

$$24 / 2 = 0$$

$$12 / 2 = 0$$

$$6 / 2 = 0$$

$$3 / 2 = 1$$

$$1 / 2 = 1$$

$$0.9135 \times 2 = 1$$

$$0.8272 \times 2 = 1$$

$$0.6544 \times 2 = 1$$

$$0.3088 \times 2 = 0$$

$$0.6176 \times 2 = 1$$

$$0.7352 \times 2 = 0$$

$$0.4704 \times 2 = 0$$

$$0.9408 \times 2 = 1$$

$$0.8816 \times 2 = 1$$

$$0.7632 \times 2 = 1$$

$$0.5264 \times 2 = 1$$

$$0.0528 \times 2 = 0$$

1 10001010 1101. 1110100 11110

1. 1000 1010 1101 1110 100 11110 $\times 2^{12}$

exp = 127 + 12 = 139 = 10001011

$$\begin{array}{c|c} S & E \\ \hline 0 & 10001011 \end{array} \quad \begin{array}{c} M \\ \hline 10001010110111101001111 \end{array}$$

Quiz #2:

$$1 \cdot \frac{1}{\sqrt{1+x}} = 1 - \frac{1}{2}x + \frac{3}{8}x^2 - \frac{5}{16}x^3 + O(x^4)$$

$$\bullet \text{ Sen}(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} + O(x^7)$$

$$a) \frac{1}{\sqrt{1+x}} + \text{Sen}(x) = 1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16} + O(x^4)$$

$$x - \frac{x^3}{3!} + \frac{x^5}{5!} + O(x^7) = 1 + \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16} + O(x^4)$$

$$\frac{1}{\sqrt{1+x}} + \text{Sen}(x) = 1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16} + O(x^4)$$

El orden de aproximación es: $O(x^4)$

$$b) \frac{1}{\sqrt{1+x}} \sin(x) = \left(1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16} + O(x^4)\right) \left(x - \frac{x^3}{3!} + \frac{x^5}{5!} + O(x^7)\right)$$

$$= \left(1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16}\right) \left(x - \frac{x^3}{3!} + \frac{x^5}{5!}\right) + \left(1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16}\right) O(x^4) +$$

$$+ \left(x - \frac{x^3}{3!} + \frac{x^5}{5!}\right) O(x^4) + O(x^4) O(x^4)$$

$$= x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^4}{2} + \frac{x^4}{12} - \frac{x^6}{240} + \frac{3x^5}{8} - \frac{3x^5}{48} + \frac{3x^7}{960} - \frac{5x^7}{16} + \frac{5x^6}{96} - \frac{5x^8}{1920} +$$

$$O(x^7) + O(x^5) + O(x^4) = x - \frac{x^3}{2} + \frac{x^3}{24} - \frac{11x^4}{48} + O(x^5)$$

El orden de aproximación es: $O(x^5)$

$$2. \cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} + O(x^6)$$

$$\circ \sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} + O(x^7)$$

$$a) \cos(x) + \sin(x) = x - \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + O(x^6) + O(x^7)$$

$$\cos(x) + \sin(x) = x - \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + O(x^6)$$

Orden de Aproximación = $O(x^6)$

$$b) \cos(x) \sin(x) = \left(1 - \frac{x^2}{2!} + \frac{x^4}{4!}\right) \left(x - \frac{x^3}{3!} + \frac{x^5}{5!}\right) + \left(1 - \frac{x^2}{2!} + \frac{x^4}{4!}\right) O(x^6) +$$

$$\left(x - \frac{x^3}{3!} + \frac{x^5}{5!}\right) O(x^6) + O(x^6) O(x^6)$$

$$= x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^5}{12!} + \frac{x^5}{12} - \frac{x^7}{240} + \frac{x^5}{4!} - \frac{x^7}{144} - \frac{x^9}{720} + O(x^7) + O(x^7) +$$

$$O(x^9) = x - \frac{2x^3}{3} + \frac{7x^5}{15} + O(x^7)$$

Orden de Aproximación = $O(x^7)$

$$3. \circ \frac{1}{1-x} = 1 - x + x^2 + x^3 + O(x^4)$$

$$\circ \cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} + O(x^6)$$

$$a) \frac{1}{1-x} + \cos(x) = 2 - x + \frac{x^2}{2} + x^3 + \frac{x^4}{4} + O(x^4) + O(x^6)$$

$$\frac{1}{1-x} + \cos(x) = 2 - x + \frac{x^2}{2} + x^3 + O(x^4)$$

Orden de Aproximación: $O(x^4)$

$$b) \frac{1}{1-x} \cdot \cos(x) = (1 - x + x^2 + x^3) \left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} \right) + O(x^6)$$

$$(1 - x + x^2 + x^3) O(x^6) + \left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} \right) O(x^4) + O(x^4) O(x^6)$$

$$= 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - x + \frac{x^3}{2!} - \frac{x^5}{4!} + x^2 - \frac{x^4}{2!} + \frac{x^6}{4!} + x^3 - \frac{x^5}{2!} + \frac{x^7}{4!} +$$

$$O(x^6) + O(x^4) + O(x^{10}) = 1 + \frac{x^2}{2!} - x - \frac{3x^3}{2!} + O(x^4)$$

Orden de Aproximación: $O(x^4)$

4.

$$4. \circ e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + O(x^5)$$

$$\circ \cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} + O(x^6)$$

$$a) e^x + \cos(x) = 2 + x + \frac{x^3}{3!} + \frac{x^4}{12} + O(x^5) + O(x^6)$$

$$e^x + \cos(x) = 2 + x + \frac{x^3}{3!} + \frac{x^4}{12} + O(x^5)$$

Orden de Aproximación: $O(x^5)$

$$\circ e^x \cdot \cos(x) = \left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} \right) \left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} \right) + \left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} \right) O(x^6)$$

$$\left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} \right) O(x^6) + O(x^5) O(x^6) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} + x - \frac{x^3}{2!} + \frac{x^5}{4!} + \frac{x^2}{2!} - \frac{x^4}{4} + \frac{x^6}{48} +$$

$$\frac{x^3}{3!} - \frac{x^5}{12} + \frac{x^7}{144} + \frac{x^4}{4!} - \frac{x^6}{48} + \frac{x^8}{576} + O(x^6) + O(x^5) + O(x^{11})$$

$$1 + x - \frac{x^3}{3} + O(x^5)$$

Orden de Aproximación $O(x^5)$

$$5. e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + O(x^5)$$

$$\frac{1}{\sqrt{1+x}} = 1 - \frac{1}{2}x + \frac{3}{8}x^2 - \frac{5}{16}x^3 + O(x^4)$$

$$a) e^x + \frac{1}{\sqrt{1+x}} = 2 + x + \frac{7}{8}x^2 - \frac{7}{96}x^3 + \frac{x^4}{4!} + O(x^4) + O(x^5)$$

$$= 2 + x + \frac{7}{8}x^2 - \frac{7}{96}x^3 + O(x^4)$$

Orden de Aproximación $O(x^4)$

$$b) e^x \cdot \frac{1}{\sqrt{1+x}} = \left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!}\right) \left(1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16}\right) +$$

$$\left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!}\right) O(x^4) + \left(1 - \frac{x}{2} + \frac{3x^2}{8} - \frac{5x^3}{16}\right) O(x^5) +$$

$$O(x^5) O(x^4) = 1 - \cancel{\frac{x}{2}} + \frac{3x^2}{8} - \frac{5x^3}{16} + \cancel{x} - \cancel{\frac{x^2}{2}} + \frac{3x^3}{8} - \frac{5x^4}{16} + \cancel{\frac{x}{2!}} - \cancel{\frac{x^2}{4}} + \frac{3x^4}{16} +$$

$$\frac{x^5}{32} + \frac{x^3}{3!} - \frac{x^4}{12} + \frac{3x^5}{48} - \frac{5x^6}{96} + \frac{x^4}{4!} - \frac{x^5}{48} + \frac{3x^6}{192} - \frac{5x^7}{384} +$$

$$O(x^5) + O(x^4) + O(x^9) = 1 + x^2 - \frac{x^2}{8} - \frac{x^3}{48} + O(x^4)$$

Orden de Aproximación

$$6. \ln(1+x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + O(x^5)$$

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} + O(x^7)$$

$$a) \ln(1+x) + \sin(x) = 2x - \frac{x^2}{2} + \frac{x^3}{6} - \frac{x^4}{4} + \frac{x^5}{5!} + O(x^5) + O(x^7)$$

$$= 2x - \frac{x^2}{2} + \frac{x^3}{6} - \frac{x^4}{4} + O(x^5)$$

Orden de Aproximación $O(x^5)$

$$b) \ln(1+x) \approx \ln(x) = \left(x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4}\right) \left(x - \frac{x^3}{3!} + \frac{x^5}{5!}\right)$$

$$\left(x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4}\right) O(x^5) + \left(x - \frac{x^3}{3!} + \frac{x^5}{5!}\right) O(x^3) + O(x^3) O(x^5)$$

$$= x^2 - \frac{x^4}{2!} + \frac{x^6}{3!} - \frac{x^7}{2} + \frac{x^5}{12} - \frac{x^7}{240} + \frac{x^4}{6} - \frac{x^6}{16} - \frac{x^8}{240} +$$

$$\frac{x^5}{4} - \frac{x^7}{24} + \frac{x^9}{720} + O(x^9) + O(x^6) + O(x^{12})$$

$$= x^2 - \frac{x^3}{2} - \frac{x^4}{2} + \frac{x^5}{3} + O(x^6)$$

Orden de Aproximación $O(x^6)$

Quiz # 3

$$1. f(x) = 2\sin(\sqrt{x}) - x = 0$$

$$x_0 = 0.5$$

$$g(x) = 2\sin(\sqrt{x})$$

$$x_1 = g(x_0) = 1.299273878$$

$$x_2 = g(x_1) = 1.819147504$$

$$x_3 = g(x_2) = 1.950573917$$

$$x_4 = g(x_3) = 1.967942513$$

$$x_5 = g(x_4) = 1.972068221$$

$$x_6 = g(x_5) = 1.97349192$$

$$x_7 = g(x_6) = 1.972376656$$

$$x_8 = g(x_7) = 1.972320486$$

$$x_9 = g(x_8) = 1.972380938$$

$$x_{10} = g(x_9) = 1.972380791$$

$$2. f(x) = x^3 + 2x^2 + 10x - 20 = 0$$

$$x_0 = 1$$

$$g(x) = \frac{x^2 + 20}{x^2 + 2x + 10}$$

$$x_1 = g(x_0) = 1.538461538$$

$$x_2 = g(x_1) = 1.295019157$$

$$x_3 = g(x_2) = 1.401825309$$

$$x_4 = g(x_3) = 1.35420939$$

$$x_5 = g(x_4) = 1.375298092$$

$$x_6 = g(x_5) = 1.365929488$$

$$x_7 = g(x_6) = 1.370086003$$

$$x_8 = g(x_7) = 1.368241024$$

$$x_9 = g(x_8) = 1.367059812$$

$$x_{10} = g(x_9) = 1.368696398$$

3. Determinar si $f(x) = 2 + \frac{x}{2} - \frac{x^2}{4}$ en el intervalo $[1,3]$

$$x_0 = 1$$

$$x + f(x) = 2 - \frac{x}{2} - \frac{x^2}{4} \quad \frac{5}{4} = 1.25$$

$$g(x) = 2 - \frac{x}{2} - \frac{x^2}{4}$$

$$x = -4$$

$$g(1) = \frac{5}{4} = 1.25$$

$$g(3) = -\frac{7}{4} = -1.75$$

No cumple el teorema

4. Determinar si $f(x) = 2^{-x}$ tiene un unico punto fijo en el intervalo $[0,1]$ x_0

$$g(x) = 2^{-x}$$

$$g'(x) = -\ln(2) \cdot 2^{-x}$$

$$g(0) = 1$$

$$g(1) = 1/2$$

$$g'(x) < 1$$

$$\begin{aligned} x_1 &= g(x_0) = 0.70711 \\ x_2 &= g(x_1) = 0.51255 \\ x_3 &= g(x_2) = 0.65404 \\ x_4 &= g(x_3) = 0.63350 \\ x_5 &= g(x_4) = 0.64372 \\ x_6 &= g(x_5) = 0.64006 \\ x_7 &= g(x_6) = 0.64169 \\ x_8 &= g(x_7) = 0.64096 \\ x_9 &= g(x_8) = 0.64128 \\ x_{10} &= g(x_9) = 0.64114 \end{aligned}$$

$$5. f(x) = x^2 - x - 3$$

$$x_0 = 16$$

$$f'(x) = 2x - 1$$

$$p_1 = p_0 - \frac{f(p_0)}{f'(p_0)} = 2.52727$$

$$p_3 = p_2 - \frac{f(p_2)}{f'(p_2)} = 2.30182$$

$$p_2 = p_1 - \frac{f(p_1)}{f'(p_1)} = 2.31521$$

6. $f(x) = x^3 - 3x - 2$ $x_0 = 2.1$ $f'(x) = 3x^2 - 3$

$$p_1 = p_0 - \frac{f(p_0)}{f'(p_0)} = 2.00606$$

$$p_2 = p_1 - \frac{f(p_1)}{f'(p_1)} = 2.00002$$

$$p_3 = p_2 - \frac{f(p_2)}{f'(p_2)} = 2.0000$$

7. $f(x) = x^2 - x - 3$ $x_0 = 0$ $f'(x) = 2x - 1$

$$p_1 = p_0 - \frac{f(p_0)}{f'(p_0)} = -3$$

$$p_2 = p_1 - \frac{f(p_1)}{f'(p_1)} = -1.71429$$

$$p_3 = p_2 - \frac{f(p_2)}{f'(p_2)} = -1.34101$$

$$p_4 = p_3 - \frac{f(p_3)}{f'(p_3)} = -1.30317$$

8. $f(x) = (x-2)^2$ $x_0 = 2.1$ $f'(x) = 2(x-2)$

$$p_1 = p_0 - \frac{f(p_0)}{f'(p_0)} = 2.05$$

$$p_2 = p_1 - \frac{f(p_1)}{f'(p_1)} = 2.025$$

$$p_3 = p_2 - \frac{f(p_2)}{f'(p_2)} = 2.0125$$

$$p_4 = p_3 - \frac{f(p_3)}{f'(p_3)} = 2.00625$$