TAREA Taylor and binary

1. Fórmula de Taylor de segundo orden

a) $f(x) = \frac{1}{1+x^2}$, $f'(x) = \frac{-2x}{(1+x^2)^2}$, $f''(x) = \frac{-2(1+x^2)^2 + 2x(2x+2)}{(1+x^2)^4}$

$f(0) = 1$, $f'(0) = 0$, $f''(0) = -2$

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

b) $f(x) = \ln(1-x) + \ln(1+x)$ $f'(x) = \frac{-1}{1-x} + \frac{1}{1+x} = \frac{2x}{x^2-1}$ $f''(x) = \frac{2(x^2-1) - 4x^2}{(x^2-1)^2}$

$f(0) = 0$ $f'(0) = 0$ $f''(0) = -2$

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

c) $f(x) = \frac{1}{\sqrt{x}} = x^{-1/2}$ $f'(x) = \frac{-x^{-3/2}}{2}$ $f''(x) = \frac{3x^{-5/2}}{4}$

$f(x) \approx \frac{1}{\sqrt{x_0}} - \frac{x_0^{-3/2}}{2}(x-x_0) + \frac{3x_0^{-5/2}}{8}(x-x_0)^2$

2. Serie de taylor de orden 2 para aproximar el valor.

a) $\sqrt[3]{2.1} \rightarrow x_0 = 2$ $f(x) = \sqrt[3]{x}$ $f(1) = 1$

$= 1.2805$ $f'(x) = \frac{1}{3\sqrt[3]{x^2}}$ $f'(1) = 1/3$

$f''(x) = \frac{-2}{9\sqrt[3]{x^5}}$ $f''(1) = -2/9$

$f(x) \approx 1 + \frac{(x-1)}{3} - \frac{(x-1)^2}{9} = \frac{2}{3} + \frac{x}{3} - \frac{x^2}{9} + \frac{2x}{9} - \frac{1}{9} = \frac{-x^2}{9} + \frac{5x}{9} + \frac{5}{9}$

$f(2.1) \approx \frac{-(2.1)^2 + 5(2.1) + 5}{9} \approx 1.2322$

b) $f(x) = (3.14)^3 \rightarrow x_0 = 3$ $f(x) = x^3$ $f(3) = 27$

$= 30.959$ $f'(x) = 3x^2$ $f'(3) = 27$

$f''(x) = 6x$ $f''(3) = 18$

$f(x) \approx 27 + 27(x-3) + \frac{18(x-3)^2}{2} = 27x - 54 + 9x^2 - 54x + 81 = 9x^2 - 27x + 27$

$f(3.14) = 30.9564$

c) $f(x) = (2)^{2.01}$ $\rightarrow x_0 = 2$ $f(x) = 2^x$ $f(2) = 4$

4.03 $f'(x) = \ln 2 \cdot 2^x$ $f'(2) = 4\ln 2$

$f''(x) = \ln^2 2 \cdot 2^x$ $f''(2) = 4\ln^2 2$

$f(x) \approx 4 + \ln 16(x-2) + \ln^2 16 \frac{(x-2)^2}{2} = 4 + \ln 16 x - 2\ln 16 + \frac{\ln^2 16 x^2}{2} - 2\ln^2 16 x + 2\ln^2 16$

$\approx \frac{\ln^2 16 x^2}{2} + x(\ln 16 - 2\ln^2 16) + 4 - 2\ln 16 + 2\ln^2 16$ $f(2.01) \approx 4.028110$

3. A binario

a) 179

	n/2	n%2
179	89	1
	44	1
	22	0
	11	0
	5	1
	2	1
	1	0
	0	1

→ 10110011_2

b) 32

	n/2	n%2
32	16	0
	8	0
	4	0
	2	0
	1	0
	0	1

→ 100000

c) 20

	n/2	n%2
20	10	0
	5	0
	2	1
	1	0
	0	1

→ 10100

4. A decimal

a) 1110101
$1+4+16+32+64 = 117$

b) 0111001010
$2+8+64+128+256 = 458$

c) 1101
$1+4+8 = 13$

d) 010101
$1+4+16 = 21$

5. Operaciones

```
  11010101
+ 01010011
----------
 100101000
```

```
  11100010
-    11001
----------
  11001001
```

```
  01101111
- 11001001
----------
  10100110
```

```
       00011111
101 ) 10011011
      101
      01001
       101
       01000
        101
        0111
         101
         0101
          101
            0
```

```
          11100010
*            11001
------------------
          11100010
         00000000
        00000000
       11100010
      11100010
------------------
     1011000010010
```