Graficando series de Taylor

Rios Quijada Danira

28 de Febrero de 2015

1. Teorema de Taylor

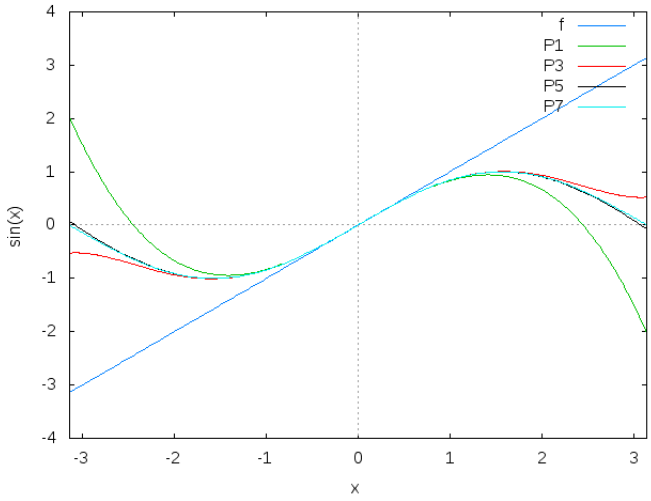
En cálculo, el teorema de Taylor, recibe su nombre del matemático británico Brook Taylor, quien lo enunció en 1712. Este teorema permite obtener aproximaciones polinómicas de una función en un entorno de cierto punto en que la función sea diferenciable.

En esta actividad hicimos varias series de taylor, de distintos grados para distintas funciones, graficando los resultados.

2. sin(x)

2.1. Código

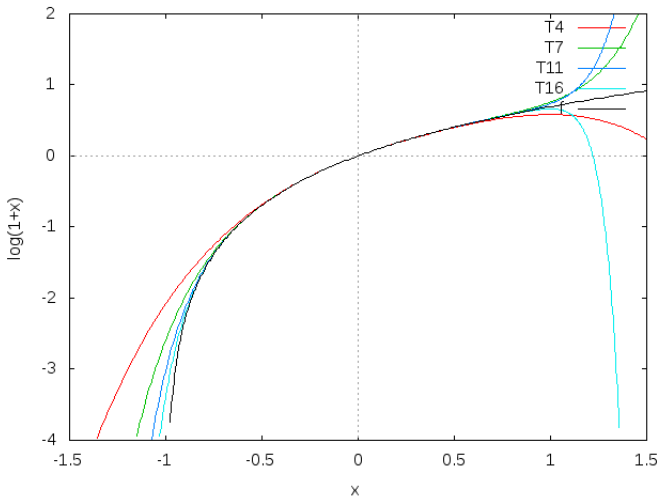
```
 /* [wxMaxima batch file version 1] [ DO NOT EDIT BY HAND! ]*/
/* [ Created with wxMaxima version 13.04.2 ] */
/* [wxMaxima: input start ] */
f(x):=sin(x);
P1(x):=taylor(f(x), x, 0, 1);
P3(x):=taylor(f(x), x, 0, 3);
P5(x):=taylor(f(x), x, 0, 5);
P7(x):=taylor(f(x), x, 0, 7);
tex(P1(x));
tex(P3(x));
tex(P5(x));
tex(P7(x));
plot2d ([P1(x), P3(x), P5(x), P7(x), f(x)], [x, -%pi, %pi],
[color, blue, green, red, black, cyan], [legend, "f", "P1",
"P3", "P5", "P7"],[axes, true], [xlabel, "x"],
[ylabel, "sin(x)"]);
/* [wxMaxima: input end ] */
/* Maxima can't load/batch files which end with a comment! */
"Created with wxMaxima"$
```



3. log (1+x)

3.1. Código

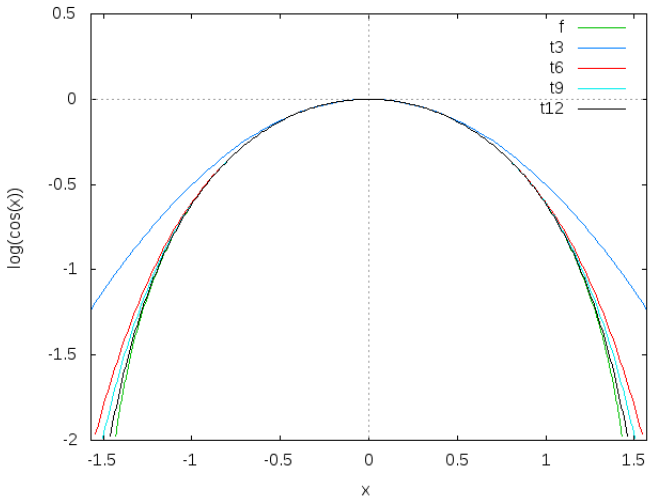
```
 /* [wxMaxima batch file version 1] [ DO NOT EDIT BY HAND! ]*/
/* [ Created with wxMaxima version 13.04.2 ] */
/* [wxMaxima: input start ] */
f(x):=log(1+x);
T4(x):=taylor(f(x), x, 0, 4);
T7(x):=taylor(f(x), x, 0, 7);
T11(x):=taylor(f(x), x, 0, 11);
T16(x):=taylor(f(x), x, 0, 16);
tex(T4(x));
tex(T7(x));
tex(T11(x));
tex(T16(x));
plot2d ([T4(x), T7(x), T11(x), T16(x), f(x)], [x, -1.5, 1.5], [y, -4,2],
[color, red, green, blue, cyan, orange],
[legend, "T4", "T7", "T11", "T16", "f"],[axes, true],
[xlabel,"x"], [ylabel, "log(1+x)"]);
/* [wxMaxima: input end ] */
/* Maxima can't load/batch files which end with a comment! */
"Created with wxMaxima"$
```



4. log(cos(x))

4.1. Código

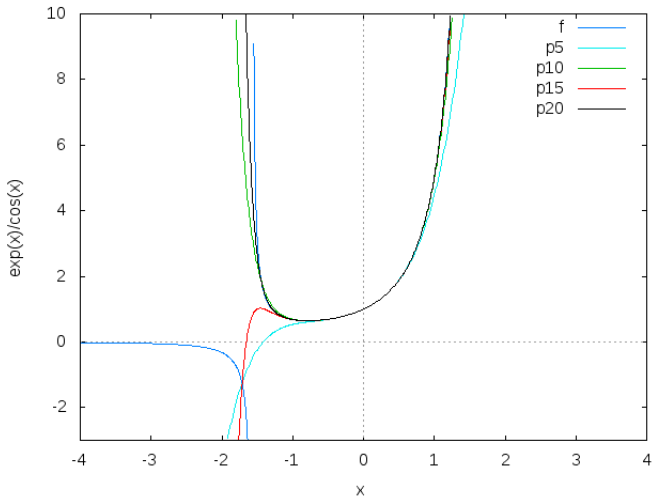
```
  /* [wxMaxima batch file version 1] [ DO NOT EDIT BY HAND! ]*/
/* [ Created with wxMaxima version 13.04.2 ] */
/* [wxMaxima: input start ] */
f(x):=log(cos(x));
t3(x):=taylor(f(x), x, 0, 3);
t6(x):=taylor(f(x), x, 0, 6);
t9(x):=taylor(f(x), x, 0, 9);
t12(x):=taylor(f(x), x, 0, 12);
tex(t3(x));
tex(t6(x));
tex(t9(x));
tex(t12(x));
plot2d ([f(x), t3(x), t6(x), t9(x), t12(x)], [x, -0.5*%pi, 0.5*%pi], [y, -2,0.5],
[color, green, blue, red, cyan, orange],
[legend, "f", "t3", "t6", "t9", "t12"], [axes, true], [xlabel,"x"],
[ylabel, "log(cos(x))"]);
/* [wxMaxima: input end ] */
/* Maxima can't load/batch files which end with a comment! */
"Created with wxMaxima"$
```



5. exp(x)/cos(x)

5.1. Código

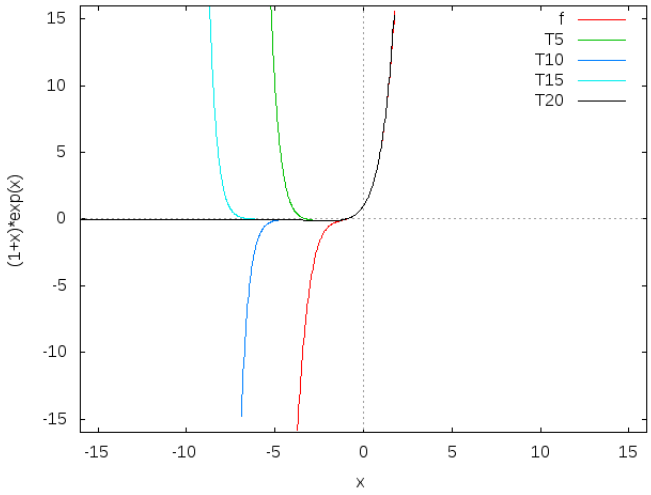
```
 /* [wxMaxima batch file version 1] [ DO NOT EDIT BY HAND! ]*/
/* [ Created with wxMaxima version 13.04.2 ] */
/* [wxMaxima: input start ] */
f(x):=exp(x)/cos(x);
p5(x):=taylor(f(x), x, 0, 5);
p10(x):=taylor(f(x), x, 0, 10);
p15(x):=taylor(f(x), x, 0, 15);
p20(x):=taylor(f(x), x, 0, 20);
tex(p5(x));
tex(p10(x));
tex(p15(x));
tex(p20(x));
plot2d ([f(x), p5(x), p10(x), p15(x), p20(x)], [x, -4, 4], [y, -3,10],
[color, blue, cyan, green, red, orange],
[legend, "f", "p5", "p10", "p15","p20"],
[axes, true], [xlabel,"x"], [ylabel, "exp(x)/cos(x)"]);
/* [wxMaxima: input end ] */
/* Maxima can't load/batch files which end with a comment! */
"Created with wxMaxima"$
```



6. (1+x)(exp(x))

6.1. Código

```
 /* [wxMaxima batch file version 1] [ DO NOT EDIT BY HAND! ]*/
/* [ Created with wxMaxima version 13.04.2 ] */
/* [wxMaxima: input start ] */
f(x):=(1+x)*exp(x);
t5(x):=taylor(f(x), x, 0, 5);
t10(x):=taylor(f(x), x, 0, 10);
t15(x):=taylor(f(x), x, 0, 15);
t20(x):=taylor(f(x), x, 0, 20);
tex(t5(x));
tex(t10(x));
tex(t15(x));
tex(t20(x));
plot2d ([t5(x), t10(x), t15(x), t20(x), f(x)], [x, -16, 16], [y, -16,16],
[color, red, green, blue, cyan, orange], [legend, "f", "T5", "T10", "T15", "T20"],
[axes, true], [xlabel,"x"], [ylabel, "(1+x)*exp(x)"]);
/* [wxMaxima: input end ] */
/* Maxima can't load/batch files which end with a comment! */
"Created with wxMaxima"$
```


f
T5
T10
T15
T20
(1+x)*exp(x)
x
15
10
5
0
-5
-10
-15
-15
-10
-5
0
5
10
15