

Eq & Inequalities

```
expr := (x-1)/(x+1) <= (x+1)/(x-1);  
solve(expr, x);
```

Successions de Nombres Reels

Successions

```
a := m -> if m=1 then 3; else sqrt(5+a(m-1)); end if;  
seq(evalf(a(m)), m=1..10);  
value_lim := solve(L = sqrt(5+L), L);
```

Limits

```
f := 5*(n+1)^(n+1);  
limit(f, n=infinity);
```

Zero de Fonctions

recherche de valeur lim. de f(x) "output = information"

```
with(Student[NumericalAnalysis]):  
f := 2*x^4 - 9.41*x^3 + 21.52;  
Bisection(f, x=[a, b], tolerance = 10^(-3), output = information, maxiterations = 100);  
Secant(f, x=[a, b], tolerance = 10^(-3), output = information, maxiterations = 100);  
Tangent(f, x=4.004, tolerance = 10^(-5), output = information, maxiterations = 100);
```

Formule de Taylor

```
with(Student[NumericalAnalysis]):  
f := 21/5 * exp(x+5);  
pol-f := TaylorPolynomial(f, x=1, order=3);  
res-f := TaylorPolynomial(f, x=1, order=3, error bound var = 'E');  
plot([f, pol-f], x=1..3);
```

Integrals

Méthodes Numériques

"Tools" -> "Tutor" -> "Calculus - Simple Variable" -> "Riemann Summation"

Autres

$\vec{u} \cdot \vec{v} = u_1 v_1 + u_2 v_2$
 $\vec{u} \cdot \vec{v} = \|\vec{u}\| \|\vec{v}\| \cos(\alpha)$
 $\nabla f(P) \times (X-P) = 0$

Fórmula del Error

```
with(optimization):
f := exp(3*x-4);
a := 1/4; b := 13/4; g := 2;
val_error := 10^(-9);
fx := diff(f, x$g);
val_max := maximize(fx, x=a..b);
iteracions := solve((b-a)^(g+1) / [7+80]n^g * val_max >= val_error, n);
evalf[20](iteracions);
```

Àrea Delimitada

```
f1 := (1/9)x^2 + (3/10)x - 12/2;
f2 := (3/10)x - 9/4;
intersecció := solve(f1 = f2);
area := int(f2 - f1, x=a..b); # a < b
```

* Criteri del Hesse

```
if (det == 0) continue;
else if (det < 0) punt_sella;
else if (a11 > 0) mínim;
else if (a11 < 0) màxim;
fi
```

Funcions de Diverges Variables

Calcular Derivadas Parciales

```
f := x^2*y^4 + e^xy;
fx := diff(f, x$2, y, z$4);
```

Camp Vector Gradient

```
with(VectorCalculus):
with(plots):
f := (x,y) -> x^2 + y^2;
grad-f := Gradient(f(x,y), [x,y]);
```

Corbes de Nivell

```
with(plots):
f := x^2 + y^2;
contourplot(f, x=-10..10, y=-10..10, contours=[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]);
```

```
fx-en-p := subs(fxx, punt); fyy-en-p := subs(fyy, punt); fxy-en-p := subs(fxy, punt);
determinant := fx-en-p * fyy-en-p - (fxy-en-p)^2;
```

Pla tangent

$a(x-x_0) + b(y-y_0) + c(z-z_0) = 0$ $\pi: ax + by - z + A = 0$ $P = (x_0, y_0, z_0);$

Classificar Punt

Visualitzar Funció + Punt

```
with(plots):
f := (x,y) -> x^2 + xy - 2x - y^2 + 4y - 5;
punt := [1, -4, f(1, -4)];
grafica-f := plot3d(f(x,y));
grafica-punt := pointplot3d([punt]);
display([grafica-f, grafica-punt]);
```

Criteri del Hesse *

```
f := x^3 - 3xy^2 + 2; punt := {x=0, y=0};
fxx := diff(f, x$2);
fyy := diff(f, y$2);
fxy := diff(f, x, y);
```