

TP 3 MAPLE - Derivacion

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1 Comandos MAPLE

1.1 Derivacion explicita

```
f := (x) -> cos(x^2);
g := diff(f(x), x);
diff(f(x), x$2);
g(2);
h := diff(g, x);
diff(f(x), x$3);
plot(f(x), x = -Pi .. Pi);
plot(g(x), x = -Pi .. Pi);
plot(h(x), x = -Pi .. Pi);

f2 := (x, y) -> x^2 * (x^2 + y^3)
plot3d(f2(x, y), x = -1..1, y = -1..1);
diff(f2(x, y, z), x);
diff(f2(x, y, z), x, y);
diff(f2(x, y, z), y);
diff(f2(x, y, z), y, x);
diff(f2(x, y, z), y$2);
diff(f2(x, y, z), x$1, y$2);
diff(f2(x, y, z), x, y, x);

with(VectorCalculus);
grad := Gradient(f2(x, y), [x, y]);
grad[1];
grad[2];
with(plots);
gradplot(f2(x, y), x = -1..1, y = -1..1);

hess := Hessian(f2(x, y), [x, y]);
hess[1, 1];
hess[1, 2];
hess[2, 1];
hess[2, 2];
```

1.2 Derivacion implicita

```
F := (x, y) -> x^2 + y^2 - 1;  
with(plots, implicitplot);  
implicitplot(F(x, y) = 0, x = -1..1, y = -1..1);  
implicitdiff(F(x, y) = 0, y, x);  
implicitdiff(F(x, y) = 0, y, $(x, 2));  
implicitdiff(F(x, y) = 0, y, x, x);  
  
F2 := (x, y, z) -> cos(x^2) + y^4 + sin(z^2) - 1;  
implicitplot3d(F2(x, y, z) = 0, x = -5..5, y = -5..5, z = -5..5);  
implicitdiff(F2(x, y, z) = 0, y, x);  
implicitdiff(F2(x, y, z) = 0, y, x$2, z$2);
```

2 Ejercicios

a) Calcular :

- $\frac{d}{dx}(\cos(x^5 + \exp(x)) * (x^2 - \sin(x)))$
- $\frac{d^4}{dx^4}(\sqrt{\frac{x}{1+x^2}})$
- $\frac{\partial}{\partial y}(x * \sqrt{y+5} + \cos(x * y))$
- $\frac{\partial}{\partial y} \frac{\partial}{\partial z}(x * y * z + \ln(x^2 + y^3 + z^2))$
- $\frac{\partial^2}{\partial x^2} \frac{\partial^3}{\partial z^3}(\cos(x * y * z) * (x^2 + \exp(z)))$

b) Calcular el vector gradiente y la Matriz Hessiana de $f(x, y, z) = \exp(\cos(x^2 * y)) * z^2$.