Examples of Tangent Line
and
Tangent Plane

> with(plots):
Warning, the name changecoords has been redefined
> f:=x^(1/3);
f := x^{1/3}
> plot(f, x=0..2);
\begin{align*}
mx & := \frac{1}{3} x^{(2/3)} \\
m & := \frac{1}{3} \\
y1 & := 1 \\
x1 & := 1 \\
EqOfLine & := y - 1 = \frac{1}{3} x - \frac{1}{3} \\
h & := \text{solve}(\text{EqOfLine}, y);
\end{align*}
\[ h := \frac{2}{3} + \frac{1}{3}x \]

\[
\text{plot}\{\{f, h\}, x=0..2};
\]

\[
f := x^2 + y^3;
\]

\[
f := x^2 y + y^3
\]

\[
p1 := \text{plot3d}([x, y, f], x=0..3, y=0..3, \text{axes=boxed}, \text{labels=[X,Y,Z]});
\]

\[
\text{display}(p1);
\]
\textgreater; dxf := diff(f, x); \\
\text{dxf} := 2 \times y \\
\textgreater; dyf := diff(f, y); \\
\text{dyf} := x^2 + 3 \times y^2 \\
\textgreater; z1 := subs(x=1, y=2, f); \\
z1 := 10 \\
\textgreater; dfx1 := subs(x=1, y=2, dxf); \\
dfx1 := 4 \\
\textgreater; dfy1 := subs(x=1, y=2, dyf); \\
dfy1 := 13 \\
\textgreater; h := z1 + dfx1 \cdot (x-1) + dfy1 \cdot (y-2); \\
h := -20 + 4 \times x + 13 \times y \\
\textgreater; p2 := plot3d([x, y, h], x=0..3, y=0..3, style=patchnogrid, color=pink): \\
\textgreater; display({p1, p2});
with(plottools):

Warning, the assigned name arrow now has a global binding

p3:=sphere([1,2,z1], .1, color=black):

display({p1, p2, p3});