Diferenciální počet funkcí více proměnných

Diferenciál vyššího řádu

Diferenciál m-tého řádu funkce $f(x; y)$ v bodě $(x_0; y_0)$ určíme podle vzorce:

$$\mathrm{d}^m f\left(x_0; y_0\right)(h; k)=\sum_{j=0}^{m}\binom{m}{j}\frac{\partial^m f}{\partial_x^{m-j}\partial_y^{j}}\left(x_0; y_0\right)h^{m-j}k^{j}$$

$m=1 \rightarrow \binom{1}{0} f_x\left(x_0; y_0\right)h+\binom{1}{1} f_y\left(x_0; y_0\right)k=f_x\left(x_0; y_0\right)h+f_y\left(x_0; y_0\right)k$

$m=2 \rightarrow \binom{2}{0} f_{xx}\left(x_0; y_0\right)h^2+\binom{2}{1} f_{xy}\left(x_0; y_0\right)hk+\binom{2}{2} f_{yy}\left(x_0; y_0\right)k^2=$
$=f_{xx}\left(x_0; y_0\right)h^2+2f_{xy}\left(x_0; y_0\right)hk+f_{yy}\left(x_0; y_0\right)k^2$

$m=3 \rightarrow \binom{3}{0} f_{xxx}\left(x_0; y_0\right)h^3+\binom{3}{1} f_{xxy}\left(x_0; y_0\right)h^2k+\binom{3}{2} f_{xyy}\left(x_0; y_0\right)hk^2+\binom{3}{3} f_{yyy}\left(x_0; y_0\right)k^3=$
$=f_{xxx}\left(x_0; y_0\right)h^3+3f_{xxy}\left(x_0; y_0\right)h^2k+3f_{xyy}\left(x_0; y_0\right)hk^2+f_{yyy}\left(x_0; y_0\right)k^3$