$$f(x_1 + \dot{x}_1\mathbf{d}_1, x_2 + \dot{x}_2\mathbf{d}_2) =$$
$$(x_1 + \dot{x}_1\mathbf{d}_1)(x_2 + \dot{x}_2\mathbf{d}_2) + \sin(x_1 + \dot{x}_1\mathbf{d}_1) =$$
$$x_1x_2 + (x_2 + \cos(x_1))\dot{x}_1\mathbf{d}_1 + x_1\dot{x}_2\mathbf{d}_2$$