```
> a:= arctan(x)*exp(-x^2+1)*ln(x^2+1);
```

$$a := \arctan(x)\, e^{-x^2+1} \ln(x^2+1) \tag{1}$$

```
> Da:=diff(a,x);
```

$$Da := \frac{e^{-x^2+1}\ln(x^2+1)}{x^2+1} - 2\arctan(x)\, x\, e^{-x^2+1}\ln(x^2+1) + \frac{2\arctan(x)\, e^{-x^2+1} x}{x^2+1} \tag{2}$$

```
> collect(Da,[arctan,ln,exp]);
```

$$\left(-2\, x\, e^{-x^2+1}\ln(x^2+1) + \frac{2\, e^{-x^2+1} x}{x^2+1}\right)\arctan(x) + \frac{e^{-x^2+1}\ln(x^2+1)}{x^2+1} \tag{3}$$

```
> collect(Da,[exp,arctan,ln]);
```

$$\left(\left(-2\, x\ln(x^2+1) + \frac{2\, x}{x^2+1}\right)\arctan(x) + \frac{\ln(x^2+1)}{x^2+1}\right) e^{-x^2+1} \tag{4}$$

```
> with(VectorCalculus):
> BasisFormat(false);
```

$$true \tag{5}$$

```
> f:=<t,exp(t),t*sin(2*t)>;
```

$$f := \begin{bmatrix} t \\ e^{t} \\ t\sin(2\, t) \end{bmatrix} \tag{6}$$

```
> Df:=diff(f,t);
```

$$Df := \begin{bmatrix} 1 \\ e^{t} \\ \sin(2\, t) + 2\, t\cos(2\, t) \end{bmatrix} \tag{7}$$

```
> g:= log(x^4*y^2*z^2);
```

$$g := \ln(x^4 y^2 z^2) \tag{8}$$

```
> Dg:=Gradient(g,[x,y,z]);
```

$$Dg := \begin{bmatrix} \frac{4}{x} \\ \frac{2}{y} \\ \frac{2}{z} \end{bmatrix} \tag{9}$$

```
> h:=<sin(x^2+y^2)^2,cos(x^2+y^2)^2>;
```

$$h := \begin{bmatrix} \sin(x^2+y^2)^2 \\ \cos(x^2+y^2)^2 \end{bmatrix} \tag{10}$$

```
> Dh := Jacobian(h,[x,y]);
```

$$Dh := \begin{bmatrix} 4\cos(x^2+y^2)\sin(x^2+y^2)x & 4\cos(x^2+y^2)\sin(x^2+y^2)y \\ -4\cos(x^2+y^2)\sin(x^2+y^2)x & -4\cos(x^2+y^2)\sin(x^2+y^2)y \end{bmatrix} \quad (11)$$

```
> map(combine,Dh,trig);
```

$$\begin{bmatrix} 2x\sin(2x^2+2y^2) & 2y\sin(2x^2+2y^2) \\ -2x\sin(2x^2+2y^2) & -2y\sin(2x^2+2y^2) \end{bmatrix} \quad (12)$$

```
> restart; # Alternativ b), c) und d) ohne VectorCalculus Package
> f:=<t,exp(t),t*sin(2*t)>;
```

$$f := \begin{bmatrix} t \\ e^t \\ t\sin(2t) \end{bmatrix} \quad (13)$$

```
> Df:=map(diff,f,t);
```

$$Df := \begin{bmatrix} 1 \\ e^t \\ \sin(2t) + 2t\cos(2t) \end{bmatrix} \quad (14)$$

```
> g:= log(x^4*y^2*z^2);
```

$$g := \ln(x^4 y^2 z^2) \quad (15)$$

```
> Dg:=[diff(g,x),diff(g,y),diff(g,z)];
```

$$Dg := \left[\frac{4}{x}, \frac{2}{y}, \frac{2}{z}\right] \quad (16)$$

```
> Dg:=<diff(g,x),diff(g,y),diff(g,z)>; # alternativ
```

$$Dg := \begin{bmatrix} \frac{4}{x} \\ \frac{2}{y} \\ \frac{2}{z} \end{bmatrix} \quad (17)$$

```
> h:= <sin(x^2+y^2)^2,cos(x^2+y^2)^2>;
```

$$h := \begin{bmatrix} \sin(x^2+y^2)^2 \\ \cos(x^2+y^2)^2 \end{bmatrix} \quad (18)$$

```
> Dh := [map(diff,h,x),map(diff,h,y)];
```

$$Dh := \left[\begin{bmatrix} 4\cos(x^2+y^2)\sin(x^2+y^2)x \\ -4\cos(x^2+y^2)\sin(x^2+y^2)x \end{bmatrix}, \begin{bmatrix} 4\cos(x^2+y^2)\sin(x^2+y^2)y \\ -4\cos(x^2+y^2)\sin(x^2+y^2)y \end{bmatrix}\right] \quad (19)$$

```
> map(combine,Dh,trig);
```

$$\left[\begin{bmatrix} 2x\sin(2x^2+2y^2) \\ -2x\sin(2x^2+2y^2) \end{bmatrix}, \begin{bmatrix} 2y\sin(2x^2+2y^2) \\ -2y\sin(2x^2+2y^2) \end{bmatrix}\right] \tag{20}$$