1

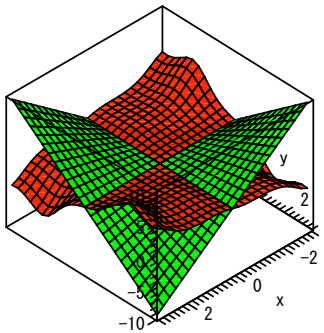
```
> f1:=unapply(-x*y,x,y);
  f2:=unapply(x*y*exp(-sin(x)^2-cos(y)^2),x,y);
```

$$f1 := (x,y) \to -x\,y$$

$$f2 := (x,y) \to x\,y\,e^{-\sin(x)^2-\cos(y)^2} \qquad (1.1)$$

```
> aa:=Pi;
  plot3d([f1(x,y),f2(x,y)],x=-aa..aa,y=-aa..aa,color=[green,red]);
```

$$aa := \pi$$




```
> evalf(f1(Pi,Pi));
  evalf(f2(Pi,Pi));
```

$$-9.869604404$$
$$3.630824553 \qquad (1.2)$$

```
> e1:=(exp(-a*x)-exp(-b*x))/x;
  diff(e1,x);
```

$$e1 := \frac{e^{-a\,x}-e^{-b\,x}}{x}$$

$$\frac{-a\,e^{-a\,x}+b\,e^{-b\,x}}{x}-\frac{e^{-a\,x}-e^{-b\,x}}{x^2} \qquad (1.3)$$

```
> restart;
  e2:=1/(sqrt((x-a)*(x-b)));
  e3:=int(e2,x=a..b);
```

$$e2 := \frac{1}{\sqrt{(x-a)\,(x-b)}}$$

$$e3 := -\ln(a-b)+\ln(b-a) \qquad (1.4)$$

さらにa<>bを仮定して単純化することが可能．答えが複素数領域にあることが分かる．

```
> assume(a-b>0);
  simplify(combine(e3));
  assume(a-b<0);
  simplify(combine(e3));
```

$$I\,\pi$$
$$-I\,\pi \qquad (1.5)$$

2

```
> restart;
  with(LinearAlgebra):
  A:=Matrix(3,3,[[3,-1,1],[2,-1,2],[1,2,-3]]);
  b:=Vector([1,3,2]);
```

$$A := \begin{bmatrix} 3 & -1 & 1 \\ 2 & -1 & 2 \\ 1 & 2 & -3 \end{bmatrix}$$

$$b := \begin{bmatrix} 1 \\ 3 \\ 2 \end{bmatrix} \qquad (2.1)$$

```
> MatrixInverse(A).b;
```

$$\begin{bmatrix} 1 \\ 5 \\ 3 \end{bmatrix} \qquad (2.2)$$

3

```
> restart;
  f:=x->x^2-4*x+1;
```

$$f := x \to x^2-4\,x+1 \qquad (3.1)$$

```
> df:=unapply(diff(f(x),x),x);
```

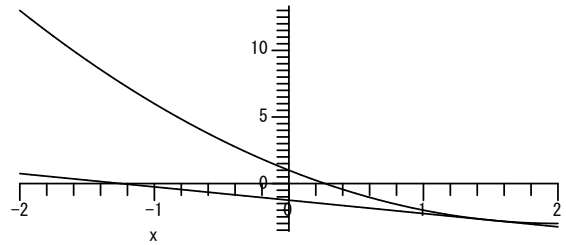
$$df := x \to 2\,x-4 \qquad (3.2)$$

```
> x0:=3/2;
  f2:=unapply(f(x0)+df(x0)*(x-x0),x);
```

$$x0 := \frac{3}{2}$$

$$f2 := x \to -\frac{5}{4} - x \tag{3.3}$$

```
> plot([f2(x),f(x)],x=-2..2,color=black);
```




```
> solve(f2(x)=0,x);
```

$$-\frac{5}{4} \tag{3.4}$$

4

```
> restart;
  f1:=unapply(x^2,x);
  f2:=unapply(x^2-4*x-4,x);
```

$$f1 := x \to x^2$$

$$f2 := x \to x^2 - 4x - 4 \tag{4.1}$$

```
> f3:=a*x+b;
```

$$f3 := a\,x + b \tag{4.2}$$

```
> s1:=solve(f1(x)=f3,x);
```

$$s1 := \frac{1}{2}a + \frac{1}{2}\sqrt{a^2+4b},\ \frac{1}{2}a - \frac{1}{2}\sqrt{a^2+4b} \tag{4.3}$$

```
> s2:=solve(f2(x)=f3,x);
```

$$s2 := 2 + \frac{1}{2}a + \frac{1}{2}\sqrt{32+8a+a^2+4b},\ 2 + \frac{1}{2}a - \frac{1}{2}\sqrt{32+8a+a^2+4b} \tag{4.4}$$

```
> eq1:=(s1[1]-s1[2])=0;
```

$$eq1 := \sqrt{a^2+4b} = 0 \tag{4.5}$$

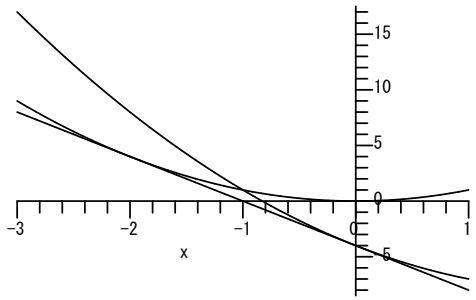
```
> eq2:=(s2[1]-s2[2])=0;
```

$$eq2 := \sqrt{32+8a+a^2+4b} = 0 \tag{4.6}$$

```
> solve({eq1,eq2},{a,b});
```

$$\{a=-4, b=-4\} \tag{4.7}$$

```
> assign(%);
> plot([f1(x),f2(x),a*x+b],x=-3..1,color=black);
```



5

```
> restart;
  roll:=rand(1..100):
  n:=5;
  A:=Array([seq(roll(),i=1..n)]);
```

$$n := 5$$

$$A := \begin{bmatrix} 93 & 45 & 96 & 6 & 98 \end{bmatrix} \tag{5.1}$$

```
> i_max:=0;
  for i from 1 to n do
    if (A[i]>i_max) then
      i_max:=A[i];
    end if;
  end do;
  i_max;
```

$$i\_max := 0$$

$$98 \tag{5.2}$$