1

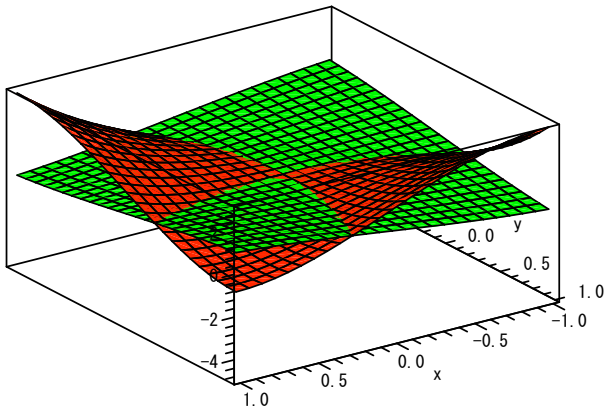
```
> diff(sin(5*x)+sin(x)^5,x);
```

$$5\cos(5x)+5\sin(x)^4\cos(x) \tag{1.1}$$

```
> int(1/(x*sqrt(x^2-1)),x=1..infinity);
```

$$\frac{1}{2}\pi \tag{1.2}$$

```
> plot3d([sin(x*y),x^3+y^3-3*x*y],x=-1..1,y=-1..1,color=[green,red]);
```




```
> f:=x->log(sqrt((1+cos(x))/(1-cos(x))));
  evalf(f(Pi/4));
```

$$f := x \to \log\left(\sqrt{\frac{1+\cos(x)}{1-\cos(x)}}\right)$$

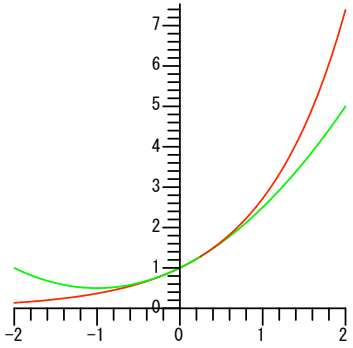
$$0.8813735865 \tag{1.3}$$

2

```
> f:=x->exp(x);
  f2:=unapply(convert(series(f(x),x=0,3),polynom),x);
  plot([f(x),f2(x)],x=-2..2);
```

$$f := x \to e^x$$

$$f2 := x \to 1 + x + \frac{1}{2}x^2$$



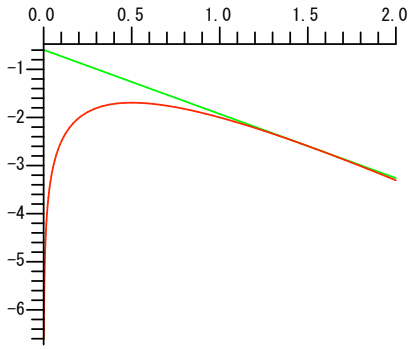

```
> f:=x->log(x)-2*x;
  a:=unapply(diff(f(x),x),x);
  x0:=3/2;
  f2:=a(x0)*(x-x0)+f(x0);
  plot([f(x),f2(x)],x=0..2);
```

$$f := x \to \log(x) - 2x$$

$$a := x \to \frac{1}{x} - 2$$

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

$$f2 := -\frac{4}{3}x - 1 + \ln\left(\frac{3}{2}\right)$$



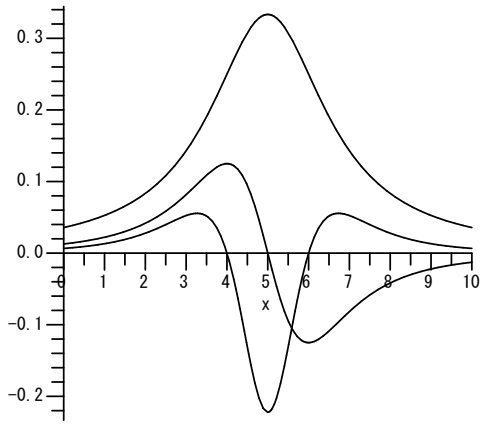
3

```
> restart;
  x0:=5;
  a:=sqrt(3);
  f:=x->1/(a^2+(x-x0)^2);
  plot([f(x),diff(f(x),x),diff(f(x),x,x)],x=0..10,color=[black]);
```

$$x0 := 5$$

$$a := \sqrt{3}$$

$$f := x \rightarrow \frac{1}{a^2 + (x - x0)^2}$$




```
> solve(diff(f(x),x,x)=0,x);
```

$$6, 4 \qquad (3.1)$$

4

```
> restart;
  with(LinearAlgebra):
> A:=Matrix(3,3,[[1,a,0],[a,2,a],[0,a,1]]);
```

$$A := \begin{bmatrix} 1 & a & 0 \\ a & 2 & a \\ 0 & a & 1 \end{bmatrix} \qquad (4.1)$$

```
> I,V:=Eigenvectors(A);
```

$$I, V := \begin{bmatrix} \frac{3}{2} + \frac{1}{2}\sqrt{1+8a^2} \\ \frac{3}{2} - \frac{1}{2}\sqrt{1+8a^2} \\ 1 \end{bmatrix}, \left[\frac{2a^2}{\left(-\frac{1}{2} + \frac{1}{2}\sqrt{1+8a^2}\right)\left(\frac{1}{2} + \frac{1}{2}\sqrt{1+8a^2}\right)}, \right. \qquad (4.2)$$

$$\left. \frac{2a^2}{\left(-\frac{1}{2} - \frac{1}{2}\sqrt{1+8a^2}\right)\left(\frac{1}{2} - \frac{1}{2}\sqrt{1+8a^2}\right)}, -1 \right], \left[\frac{2a}{-\frac{1}{2} + \frac{1}{2}\sqrt{1+8a^2}}, \right.$$

$$\left. \frac{2a}{-\frac{1}{2} - \frac{1}{2}\sqrt{1+8a^2}}, 0 \right], [1, 1, 1]$$

```
> I[1];
```

$$\frac{3}{2} + \frac{1}{2}\sqrt{1+8a^2} \qquad (4.3)$$

```
> I[2];
```

$$\frac{3}{2} - \frac{1}{2}\sqrt{1+8a^2} \qquad (4.4)$$

```
> solve(I[1]=3,a);
```

$$1, -1 \qquad (4.5)$$

```
> solve(I[2]=0,a);
```

$$1, -1 \qquad (4.6)$$

5

```
> n:=257;
  for i from 1 to n do
  Mn:=2^i-1;
  if (isprime(Mn)) then
    print(i);
  end if;
  end do:
```

```
> n := 257
                                   2
                                   3
                                   5
                                   7
                                  13
                                  17
                                  19
                                  31
                                  61
                                  89
                                 107
                                 127                                (5.1)
>
```