

1

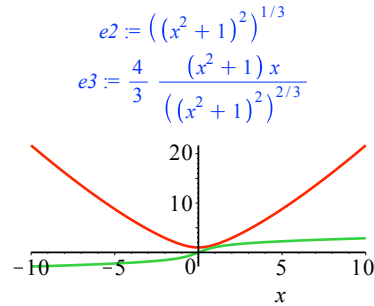
```
> e1:=cos(sin(x))^2;
diff(e1,x);
```

$$e1 := \cos(\sin(x))^2$$

$$-2 \cos(\sin(x)) \sin(\sin(x)) \cos(x)$$

(1.1)

```
> e2:=(x^2+1)^2^(1/3);
e3:=diff(e2,x);
plot([e2,e3],x);
```



$$e2 := ((x^2 + 1)^2)^{1/3}$$

$$e3 := \frac{4}{3} \frac{(x^2 + 1)x}{((x^2 + 1)^2)^{2/3}}$$

2

```
> e4:=exp(x)*sin(2*x);
int(e4,x);
```

$$e4 := e^x \sin(2x)$$

$$-\frac{2}{5} e^x \cos(2x) + \frac{1}{5} e^x \sin(2x)$$

(2.1)

```
> int(int(sqrt(4*x^2-y^2),y=0..x),x=0..1);
```

[Warning, unable to determine if -2\\*x is between 0 and x; try to use assumptions or use the AllSolutions option](#)

[Warning, unable to determine if 2\\*x is between 0 and x; try to use assumptions or use the AllSolutions option](#)

$$\frac{1}{6} \sqrt{3} + \frac{1}{9} \pi$$

(2.2)

3(a)

```
> with(LinearAlgebra);
```

```
> A:=Matrix([[1,1,1],[a,a^2,a^3],[b,b^2,b^3]]);
```

(3.1)

$$A := \begin{bmatrix} 1 & 1 & 1 \\ a & a^2 & a^3 \\ b & b^2 & b^3 \end{bmatrix}$$

(3.1)

```
> factor(Determinant(A));
```

$$-a b (b-1) (-1+a) (a-b)$$

(3.2)

3(b)

```
> A:=Matrix([[2,-1,1],[-1,2,1],[1,1,2]]);
```

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

(4.1)

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

$$l, V := \begin{bmatrix} 3 \\ 3 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 & 1 & -1 \\ 1 & 0 & -1 \\ 0 & 1 & 1 \end{bmatrix}$$

(4.2)

```
> v1:=Column(V,1);
```

```
l[1].v1;
```

```
A.v1;
```

$$v1 := \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} -3 \\ 3 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} -3 \\ 3 \\ 0 \end{bmatrix}$$

(4.3)

以下同様

4

```
> restart;
```

```
> eq1:={x-2*y=-1,2*x-5*y=-sqrt(6)};
```

$$eq1 := \{x - 2y = -1, 2x - 5y = -\sqrt{6}\}$$

(5.1)

```
> s1:=solve(eq1,{x,y});
```

$$s1 := \{x = -5 + 2\sqrt{6}, y = -2 + \sqrt{6}\}$$

(5.2)

```
> eq2:=simplify(subs(s1,(2-abs(x))/abs(y)));
```

$$eq2 := \frac{-3 + 2\sqrt{6}}{-2 + \sqrt{6}}$$

(5.3)

```
> expand(denom(eq2)*(2+sqrt(6)));
```

$$2$$

(5.4)

```
> expand(numer(eq2)*(2+sqrt(6)));
```

$$6 + \sqrt{6}$$

(5.5)

5

```
> restart;
```

```
> f:=unapply(1/8*x^2,x);
```

```
g:=unapply(-x^2+3*a*x-2*a^2,x);
```

$$f := x \rightarrow \frac{1}{8} x^2$$

$$g := x \rightarrow -x^2 + 3 a x - 2 a^2$$

(6.1)

```
> s1:=solve(f(x)=g(x),x);
```

$$s1 := \frac{4}{3} a, \frac{4}{3} a$$

(6.2)

```
> f(s1[1]);
```

$$\frac{2}{9} a^2$$

(6.3)

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

$$aa := x \rightarrow \frac{1}{4} x$$

(6.4)

```
> eq2:=expand(subs(x0=s1[1],aa(x0)*(x-x0)+f(x0)));
```

$$eq2 := \frac{1}{3} a x - \frac{2}{9} a^2$$

(6.5)

```
> h:=unapply(eq2,x);
```

$$h := x \rightarrow \frac{1}{3} a x - \frac{2}{9} a^2$$

(6.6)

```
> a:=2;
```

$$a := 2$$

(6.7)

```
> plot([f(x),g(x),h(x)],x=0..5);
```

