

> #exercice 01

TP01

> 3*5+4 ;

19

> 235/15 ;

$\frac{47}{3}$

> 3+5+17;

25

> cos(3*Pi/2) ;

0

> #Exercice 2

> diff(x^2/(1+x^2),x) ;

$$\frac{2x}{1+x^2} - \frac{2x^3}{(1+x^2)^2}$$

> simplify(%);

$$\frac{2x}{(1+x^2)^2}$$

> sum(i^2,i=1..n) ;

$$\frac{1}{3}(n+1)^3 - \frac{1}{2}(n+1)^2 + \frac{1}{6}n + \frac{1}{6}$$

> factor(%);

$$\frac{1}{6}n(n+1)(2n+1)$$

> solve(a*x^2+b*x+c,x);

$$-\frac{b - \sqrt{b^2 - 4ac}}{2a}, -\frac{b + \sqrt{b^2 - 4ac}}{2a}$$

> factor(x^2-3*x+2) ;

$$(x - 1) (x - 2)$$

> 100!; length(%); whattype(%); ifactor(100!);

158

integer

$$(2)^{97} (3)^{48} (5)^{24} (7)^{16} (11)^9 (13)^7 (17)^5 (19)^5 (23)^4 (29)^3 (31)^3 (37)^2 (41)^2 (43)^2 (47)^2 (53) (59) (61) (67) (71) (73) (79) (83) (89) (97)$$

> #Exercice 3

> diff(ln(x)/x^2,x);

$$\frac{1}{x^3} - \frac{2 \ln(x)}{x^3}$$

> solve(x^2-3*x+2,x);

2, 1

> solve(x^2+4*x+3,x);

-1, -3

> #Exercice 4

> #01

> expand(cos(a+b));

$$\cos(a) \cos(b) - \sin(a) \sin(b)$$

> expand(sin(a+b));

$$\sin(a) \cos(b) + \cos(a) \sin(b)$$

> #02

> expand(tan(a+b));

$$\frac{\tan(a) + \tan(b)}{1 - \tan(a) \tan(b)}$$

> #03

> restart;

> u:=[seq(cos(n*Pi/6),n=0..12)];

$$u := \left[1, \frac{1}{2} \sqrt{3}, \frac{1}{2}, 0, -\frac{1}{2}, -\frac{1}{2} \sqrt{3}, -1, -\frac{1}{2} \sqrt{3}, -\frac{1}{2}, 0, \frac{1}{2}, \frac{1}{2} \sqrt{3}, 1 \right]$$

> #Exercice 5

> sum(k,k=0..n) ;factor(%);

$$\frac{1}{2}(n+1)^2 - \frac{1}{2}n - \frac{1}{2}$$

$$\frac{1}{2}n(n+1)$$

> sum(k^2,k=0..n) ;factor(%);

$$\frac{1}{3}(n+1)^3 - \frac{1}{2}(n+1)^2 + \frac{1}{6}n + \frac{1}{6}$$

$$\frac{1}{6}n(n+1)(2n+1)$$

> sum(k^3,k=0..n) ;factor(%);

$$\frac{1}{4}(n+1)^4 - \frac{1}{2}(n+1)^3 + \frac{1}{4}(n+1)^2$$

$$\frac{1}{4}n^2(n+1)^2$$

> sum(1/n,n=1..infinity) ;

$$\infty$$

> sum(1/n^2,n=1..infinity) ;

$$\frac{1}{6}\pi^2$$

> sum(1/n^4,n=1..infinity) ;

$$\frac{1}{90}\pi^4$$

> #exercice06

> restart;

> (16*7^3-2*sqrt(2))/(4-10/3)-10*sqrt(2);

$$8232 - 13\sqrt{2}$$

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> 1/2*ln(2*sqrt(3)/5);
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$$\frac{1}{2} \ln\left(\frac{2}{5} \sqrt{3}\right)$$

```
> simplify(%);
```

$$\frac{1}{2} \ln(2) - \frac{1}{2} \ln(5) + \frac{1}{4} \ln(3)$$

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> exp(2*I*Pi/6);
```

$$\frac{1}{2} + \frac{1}{2} I \sqrt{3}$$

```
> cos(alpha)^2+sin(alpha)^2;
```

$$\cos(\alpha)^2 + \sin(\alpha)^2$$

```
> simplify(%);
```

$$1$$

```
> #06
```

```
> restart;
```

```
> z:=((1+I*sqrt(3))/(1-I))^20;
```

$$z := -\frac{1}{1024} (1 + I \sqrt{3})^{20}$$

```
> evalc(z);
```

$$512 - 512 I \sqrt{3}$$

```
> Re(%);
```

$$512$$

```
> Im(% %);
```

$$-512 \sqrt{3}$$

```
> abs(z);
```

$$1024$$

> argument(evalc(z));

$$-\frac{1}{3}\pi$$

> #exercice07#####

> s[n]=sum(a*i+b,i=0..n);

$$s_n = \frac{1}{2}a(n+1)^2 - \frac{1}{2}a(n+1) + b(n+1)$$

> s[n]=simplify(sum(a*i+b,i=0..n));

$$s_n = \frac{1}{2}an^2 + \frac{1}{2}an + bn + b$$

> t[n]=sum(a*b^i,i=0..n);

$$t_n = \frac{a(b^{(n+1)} - 1)}{b - 1} - \frac{a}{b - 1}$$

> t[n]=simplify(sum(a*b^i,i=0..n));

$$t_n = \frac{a(b^{(n+1)} - 1)}{b - 1}$$

> restart: for i from 0 to 5 do s[n,i]=sum(j^i,j=1..n) od;

$$s_{n,0} = n$$

$$s_{n,1} = \frac{1}{2}(n+1)^2 - \frac{1}{2}n - \frac{1}{2}$$

$$s_{n,2} = \frac{1}{3}(n+1)^3 - \frac{1}{2}(n+1)^2 + \frac{1}{6}n + \frac{1}{6}$$

$$s_{n,3} = \frac{1}{4}(n+1)^4 - \frac{1}{2}(n+1)^3 + \frac{1}{4}(n+1)^2$$

$$s_{n,4} = \frac{1}{5}(n+1)^5 - \frac{1}{2}(n+1)^4 + \frac{1}{3}(n+1)^3 - \frac{1}{30}n - \frac{1}{30}$$

$$s_{n,5} = \frac{1}{6}(n+1)^6 - \frac{1}{2}(n+1)^5 + \frac{5}{12}(n+1)^4 - \frac{1}{12}(n+1)^2$$

> restart: for i from 0 to 5 do s[n,i]=factor(sum(j^i,j=1..n)) od;

$$s_{n,0} = n$$

$$s_{n,1} = \frac{1}{2} n (n + 1)$$

$$s_{n,2} = \frac{1}{6} n (n + 1) (2 n + 1)$$

$$s_{n,3} = \frac{1}{4} n^2 (n + 1)^2$$

$$s_{n,4} = \frac{1}{30} n (n + 1) (2 n + 1) (3 n^2 + 3 n - 1)$$

$$s_{n,5} = \frac{1}{12} n^2 (2 n^2 + 2 n - 1) (n + 1)^2$$

> #03###

> restart;

> sum(1/(n)!,n=0..infinity) ;

e

> sum((-1)^n*4/(2*n+1),n=0..infinity);

π

> sum(2/(4*n^2-1),n=0..infinity);

-1