```
> assume(n,integer);
  assume(m,integer);
```

Definujeme si posloupnost sinu a cosinu

```
> s:=(x,n)->sin(n*x);
  c:=(x,n)->cos(n*x);
```

$$s := (x, n) \mapsto \sin(n \cdot x)$$
$$c := (x, n) \mapsto \cos(n \cdot x) \quad (1)$$

Koeficienty vztahujici se k sinu

```
> B:=proc(expr,var,n)
  simplify(int(expr*s(var,n),var=-pi..pi)/pi);
  end proc:
```

Koeficienty vztahujici se ke cosinu

```
> A:=proc(expr,var,n)
  simplify(int(expr*c(var,n),var=-pi..pi)/pi);
  end proc:
```

Dame dohromady celou posloupnost

```
> FP:=proc(expr,var,n)
  A(expr,var,0)/2+sum(A(expr,var,m)*c(var,m)+B(expr,var,m)*s(var,
  m),m=1..n);
  end proc:
```

Pro konstantni posloupnost dostaneme

```
> f:=x->1;
```

$$f := x \mapsto 1 \quad (2)$$

```
> FP(f(x),x,infinity);
```

$$1 + \left(\sum_{m\sim = 1}^{\infty} \frac{2 \sin(m\sim \pi) \cos(m\sim x)}{m\sim \pi} \right) \quad (3)$$

Uz staci jen doresit dosazeni do funkce sin (mx), ktera nam da vzdy nulu. Muzeme vyzkouset dalsi funkce

```
> f:=x->x: f(x);
```

$$x \quad (4)$$

```
> FP(f(x),x,infinity);
```

$$\sum_{m\sim = 1}^{\infty} \frac{\left(2 \sin(m\sim \pi) - 2 \pi m\sim \cos(m\sim \pi)\right) \sin(m\sim x)}{m\sim^2 \pi} \quad (5)$$

```
> f:=x->x^2;
```

$$f := x \mapsto x^2 \quad (6)$$

```
> FP(f(x),x,infinity);
```

$$\frac{\pi^2}{3} + \left(\sum_{m\sim = 1}^{\infty} \frac{\left(2 m\sim^2 \pi^2 \sin(m\sim \pi) - 4 \sin(m\sim \pi) + 4 m\sim \pi \cos(m\sim \pi)\right) \cos(m\sim x)}{m\sim^3 \pi} \right) \quad (7)$$

```
> FP(f(x),x,5);
```

$$\frac{\pi^2}{3} + \frac{\left(2 \pi^2 \sin(\pi) - 4 \sin(\pi) + 4 \cos(\pi) \pi\right) \cos(x)}{\pi} + \frac{\left(8 \pi^2 \sin(2 \pi) - 4 \sin(2 \pi) + 8 \pi \cos(2 \pi)\right) \cos(2 x)}{8 \pi} \quad (8)$$

$$+\frac{\left(18\,\pi^2\sin(3\,\pi)-4\sin(3\,\pi)+12\,\pi\cos(3\,\pi)\right)\cos(3\,x)}{27\,\pi}$$

$$+\frac{\left(32\,\pi^2\sin(4\,\pi)-4\sin(4\,\pi)+16\,\pi\cos(4\,\pi)\right)\cos(4\,x)}{64\,\pi}$$

$$+\frac{\left(50\,\pi^2\sin(5\,\pi)-4\sin(5\,\pi)+20\,\pi\cos(5\,\pi)\right)\cos(5\,x)}{125\,\pi}$$

```
> restart:
```

Pres obdelnik dokazeme snadno integrovat

```
> Int ( Int ( x*y, x = 3..11), y= 4..9);
```

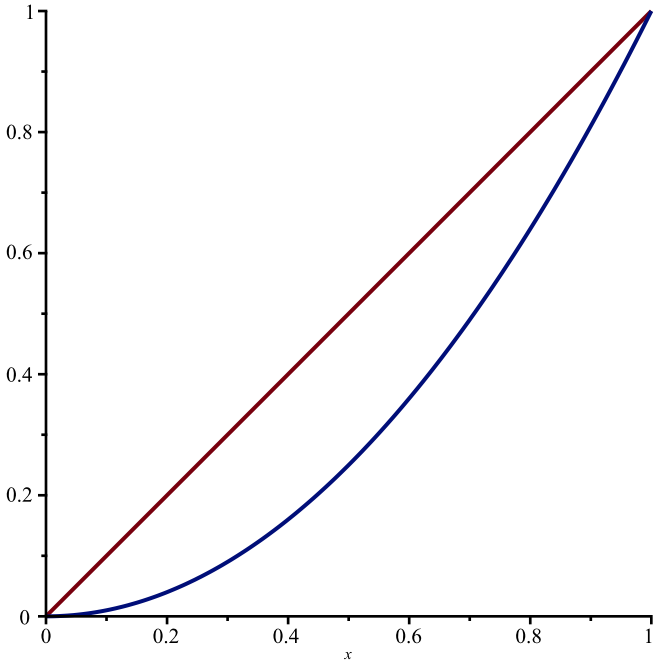
$$\int_4^9\int_3^{11} x\,y\,dx\,dy \tag{9}$$

```
> value(Int ( Int ( x*y, x = 3..11), y= 4..9)) ;
```

$$1820 \tag{10}$$

Tezsi situaci dostaneme pokud musime nejprve popsat mnozinu M. Muzeme si vse vykreslit

```
> plot([x,x^2],x=0..1);
```



Coz nam muze pomoci popsat meze.

```
> Int ( Int ( x*y, y = x^2..x), x= 0..1) ;
```

$$\int_0^1\int_{x^2}^{x} x\,y\,dy\,dx \tag{11}$$

Chteli bychom vsak znat hodnotu integralu. Dostaneme

```
> value(Int ( Int ( x*y, y = x^2..x), x= 0..1)) ;
```

$$\frac{1}{24} \tag{12}$$