```
Binomial[5, 3]
```

10

```
Binomial[x, 3]
```

$$\frac{1}{6}(-2+x)(-1+x)x$$

```
Table[Binomial[x, n], {n, 0, 6}] // MatrixForm
```

$$\begin{pmatrix} 1 \\ x \\ \frac{1}{2}(-1+x)x \\ \frac{1}{6}(-2+x)(-1+x)x \\ \frac{1}{24}(-3+x)(-2+x)(-1+x)x \\ \frac{1}{120}(-4+x)(-3+x)(-2+x)(-1+x)x \\ \text{Binomial}[x,6] \end{pmatrix}$$

```
FourD[x_] := Binomial[x, 0] + Binomial[x, 1] + Binomial[x, 2] + Binomial[x, 3] + Binomial[x, 4]
```

```
Simplify[FourD[x]]
```

$$\frac{1}{24}\left(24+14x+11x^2-2x^3+x^4\right)$$

```
Table[FourD[x], {x, 0, 6}]
```

{1, 2, 4, 8, 16, 31, 57}

```
SumSquare[x_] := 0 Binomial[x, 0] + 1 Binomial[x, 1] + 3 Binomial[x, 2] + 2 Binomial[x, 3]
```

```
Simplify[SumSquare[x]]
```

$$\frac{1}{6}x\left(1+3x+2x^2\right)$$

```
n (n + 1) (2 n + 1) / 6
```

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

```
Expand[%12]
```

$$\frac{n}{6}+\frac{n^2}{2}+\frac{n^3}{3}$$

```
SumCubes[x_] :=
 0 Binomial[x, 0] + 1 Binomial[x, 1] + 7 Binomial[x, 2] + 12 Binomial[x, 3] + 6 Binomial[x, 4]
```

```
Simplify[SumCubes[x]]
```

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