Derivazione metodi di Adams-Moulton

```
> restart:
> with(CurveFitting);
```

$$[ArrayInterpolation, BSpline, BSplineCurve, Interactive, LeastSquares, PolynomialInterpolation, RationalInterpolation, Spline, ThieleInterpolation] \quad (1)$$

Costruzione polinomio interpolante

```
> p := 1 ;
```

$$p := 1 \quad (2)$$

```
> XY := [seq( [x[k]-j*h,f[k-j]],j=-1..p)] ;
```

$$XY := [[h + x_k, f_{k+1}], [x_k, f_k], [-h + x_k, f_{k-1}]] \quad (3)$$

```
> Pint := PolynomialInterpolation( XY, z) ;
```

$$Pint := \frac{1}{2}\,\frac{(f_{k-1} - 2f_k + f_{k+1})\,z^2}{h^2} + \frac{1}{2}\,\frac{(-h f_{k-1} + h f_{k+1} + 4 f_k x_k - 2 f_{k-1} x_k - 2 f_{k+1} x_k)\,z}{h^2} + \frac{1}{2}\,\frac{2h^2 f_k + h f_{k-1} x_k - h f_{k+1} x_k - 2 f_k x_k^2 + f_{k-1} x_k^2 + f_{k+1} x_k^2}{h^2} \quad (4)$$

```
> simplify(subs( z=x[k],Pint)) ;
  simplify(subs( z=x[k]-h,Pint)) ;
  simplify(subs( z=x[k]-2*h,Pint)) ;
```

$$f_k$$

$$f_{k-1}$$

$$-3 f_k + 3 f_{k-1} + f_{k+1} \quad (5)$$

```
> IntP := simplify(int( Pint, z=x[k]..x[k]+h)) ;
```

$$IntP := \frac{1}{12}\,h\,(8 f_k - f_{k-1} + 5 f_{k+1}) \quad (6)$$

Metodo di Adams-Moulton

```
> AB := y[k+1]=y[k]+collect(IntP,[h,f]) ;
```

$$AB := y_{k+1} = y_k + \left(\frac{2}{3} f_k - \frac{1}{12} f_{k-1} + \frac{5}{12} f_{k+1}\right) h \quad (7)$$