Simpson-Regel.

Hermite Basis: H0,H1,H2,H3:

p(x)=f(alpha) H0(x)+f(alpha+h/2) H1(x) + f '(alpha+h/2) H2(x) + f(alpha+h) H3(x)

```
> H0:=-4/h^3*(x-alpha-h/2)^2*(x-alpha-h);
```

$$H0 := -\frac{4\left(x-\alpha-\frac{h}{2}\right)^2 (x-\alpha-h)}{h^3}$$

```
> H1:=-(x-alpha)*(x-alpha-h)*4/h^2;
```

$$H1 := -\frac{4\,(x-\alpha)\,(x-\alpha-h)}{h^2}$$

```
> H2:=-(x-alpha)*(x-alpha-h)*(x-alpha-h/2)*4/h^2;
```

$$H2 := -\frac{4\,(x-\alpha)\,(x-\alpha-h)\left(x-\alpha-\frac{h}{2}\right)}{h^2}$$

```
> H3:=(x-alpha-h/2)^2*(x-alpha)*4/h^3;
```

$$H3 := \frac{4\left(x-\alpha-\frac{h}{2}\right)^2 (x-\alpha)}{h^3}$$

Koeffizienten

```
> simplify(int(H0,x=alpha..alpha+h));
```

$$\frac{h}{6}$$

```
> simplify(int(H1,x=alpha..alpha+h));
```

$$\frac{2\,h}{3}$$

```
> simplify(int(H2,x=alpha..alpha+h));
```

$$0$$

```
> simplify(int(H3,x=alpha..alpha+h));
```

$$\frac{h}{6}$$

Lagrange Basis: L0,L1,L2:

p(x)=f(alpha) L0(x)+f(alpha+h/2) L1(x) + f(alpha+h) L2(x)

```
> L0:=(x-alpha-h/2)*(x-alpha-h)*2/h^2;
```

$$L0 := \frac{2\left(x-\alpha-\frac{h}{2}\right)(x-\alpha-h)}{h^2}$$

```
> L1:=-(x-alpha)*(x-alpha-h)*4/h^2;
```

$$L1 := -\frac{4\,(x-\alpha)\,(x-\alpha-h)}{h^2}$$

```
> L2:=(x-alpha)*(x-alpha-h/2)*2/h^2;
```

$$L2 := \frac{2\,(x-\alpha)\left(x-\alpha-\frac{h}{2}\right)}{h^2}$$

Koeffizienten

```
> simplify(int(L0,x=alpha..alpha+h));
```

$$\frac{h}{6}$$

```
> simplify(int(L1,x=alpha..alpha+h));
```

$$\frac{2\,h}{3}$$

```
> simplify(int(L2,x=alpha..alpha+h));
```

$$\frac{h}{6}$$

```
>
```