

```
(** INTERPOLAZIONE **)
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```
n = 20;  
dx = 1.0 / n;  
x[0] = 0;  
x[n] = 1;  
Do[x[i] = x[i - 1] + dx, {i, 1, n - 1}]  
Do[Print["i = ", i, " x[i] = ", x[i]], {i, 0, n}]
```

```
i = 0 x[i] = 0
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i = 1 x[i] = 0.05
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i = 2 x[i] = 0.1
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i = 3 x[i] = 0.15
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i = 4 x[i] = 0.2
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i = 5 x[i] = 0.25
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i = 6 x[i] = 0.3
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i = 7 x[i] = 0.35
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i = 8 x[i] = 0.4
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i = 9 x[i] = 0.45
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i = 10 x[i] = 0.5
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i = 11 x[i] = 0.55
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i = 12 x[i] = 0.6
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i = 13 x[i] = 0.65
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i = 14 x[i] = 0.7
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i = 15 x[i] = 0.75
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i = 16 x[i] = 0.8
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i = 17 x[i] = 0.85
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```
i = 18 x[i] = 0.9
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```
i = 19 x[i] = 0.95
```

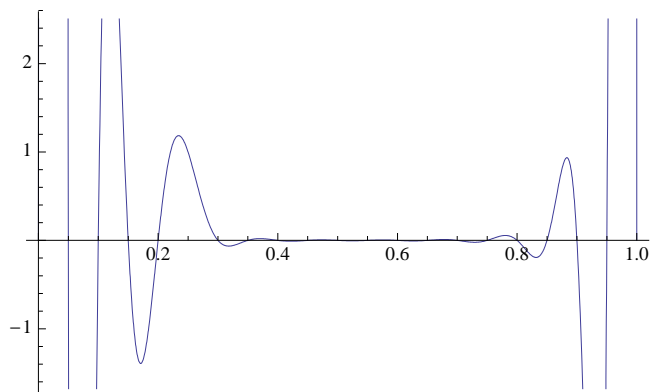
```
i = 20 x[i] = 1
```

```

num[k_, xx_] := Product[xx - x[i], {i, 0, k - 1}] * Product[xx - x[i], {i, k + 1, n}]
den[k_, xx_] := Product[x[k] - x[i], {i, 0, k - 1}] * Product[x[k] - x[i], {i, k + 1, n}]
L[k_, xx_] := num[k, xx] / den[k, xx];
Print["L[k,xx] = ", L[k, xx]]
Plot[L[5, xx], {xx, 0, 1}]

```

$$L[k, xx] = \frac{\left(\prod_{i=0}^{-1+k} (xx - x[i])\right) \prod_{i=1+k}^{20} (xx - x[i])}{\left(\prod_{i=0}^{-1+k} (-x[i] + x[k])\right) \prod_{i=1+k}^{20} (-x[i] + x[k])}$$



```

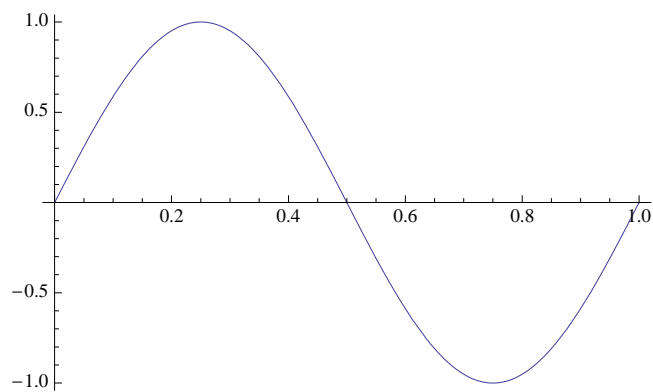
style1 = {RGBColor[1, 0, 0], Thickness[0.008]};
style2 = {RGBColor[0, 0, 1], Thickness[0.008]};
ticks1 = {{0, 0.2, 0.4, 0.6, 0.8, 1}, {-1, 0, 1}};
ticks2 = {{-1, -0.5, 0, 0.5, 1}, {-1, 0, 1}};

```

```

f[x_] := Sin[2 Pi * x]
Plot[f[x], {x, 0, 1}]

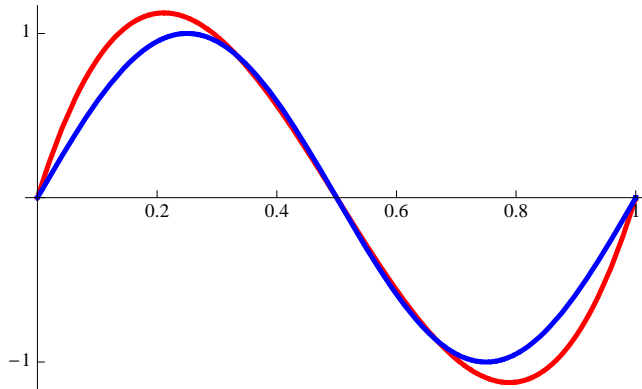
```



```

n = 3;
dx = 1.0 / n;
x[0] = 0;
y[0] = f[x[0]];
x[n] = 1;
y[n] = f[x[n]];
Do[x[i] = x[i - 1] + dx; y[i] = f[x[i]], {i, 1, n - 1}]
num[k_, xx_] := Product[xx - x[i], {i, 0, k - 1}] * Product[xx - x[i], {i, k + 1, n}]
den[k_, xx_] := Product[x[k] - x[i], {i, 0, k - 1}] * Product[x[k] - x[i], {i, k + 1, n}]
L[k_, xx_] := num[k, xx] / den[k, xx];
p[xx_] := Sum[y[k] * L[k, xx], {k, 0, n}]
Plot[{p[xx], f[xx]}, {xx, 0, 1}, PlotStyle -> {style1, style2}, Ticks -> ticks1]

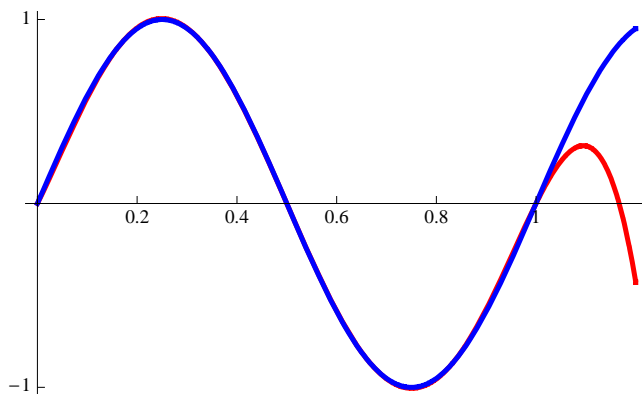
```



```

n = 6;
dx = 1.0 / n;
x[0] = 0;
y[0] = f[x[0]];
x[n] = 1;
y[n] = f[x[n]];
Do[x[i] = x[i - 1] + dx; y[i] = f[x[i]], {i, 1, n - 1}]
num[k_, xx_] := Product[xx - x[i], {i, 0, k - 1}] * Product[xx - x[i], {i, k + 1, n}]
den[k_, xx_] := Product[x[k] - x[i], {i, 0, k - 1}] * Product[x[k] - x[i], {i, k + 1, n}]
L[k_, xx_] := num[k, xx] / den[k, xx];
p[xx_] := Sum[y[k] * L[k, xx], {k, 0, n}]
Plot[{p[xx], f[xx]}, {xx, 0, 1.2}, PlotStyle -> {style1, style2}, Ticks -> ticks1]

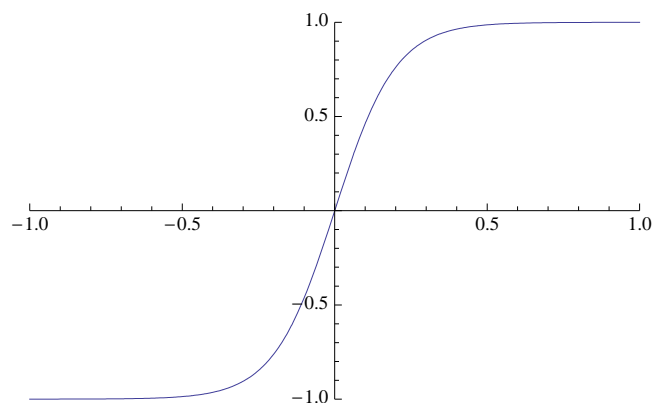
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```

Clear[f];
f[x_] := Tanh[5 x]
Plot[f[x], {x, -1, 1}, PlotRange -> {{-1, 1}, {-1, 1}}]

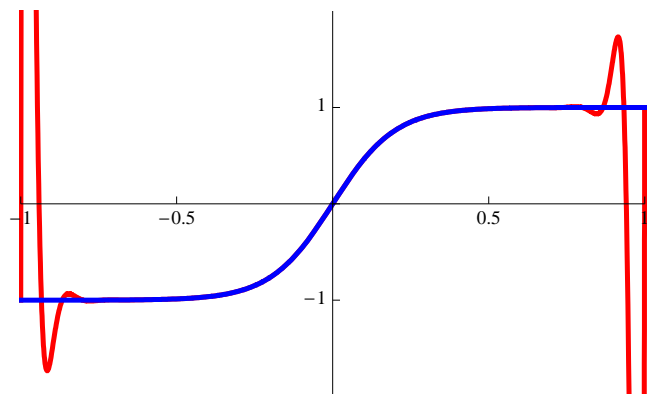
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```

n = 30;
dx = 2.0 / n;
x[0] = -1;
y[0] = f[x[0]];
x[n] = 1;
y[n] = f[x[n]];
Do[x[i] = x[i - 1] + dx; y[i] = f[x[i]], {i, 1, n - 1}]
num[k_, xx_] := Product[xx - x[i], {i, 0, k - 1}] * Product[xx - x[i], {i, k + 1, n}]
den[k_, xx_] := Product[x[k] - x[i], {i, 0, k - 1}] * Product[x[k] - x[i], {i, k + 1, n}]
L[k_, xx_] := num[k, xx] / den[k, xx];
p[xx_] := Sum[y[k] * L[k, xx], {k, 0, n}]
Plot[{p[xx], f[xx]}, {xx, -1, 1}, PlotStyle -> {style1, style2},
  Ticks -> ticks2, PlotRange -> {{-1, 1}, {-2, 2}}]

```



```
g[x_] := Tanh[x]  
Plot[g[x], {x, -1, 1}]  
Plot[g''''''[x], {x, -1, 1}]
```

