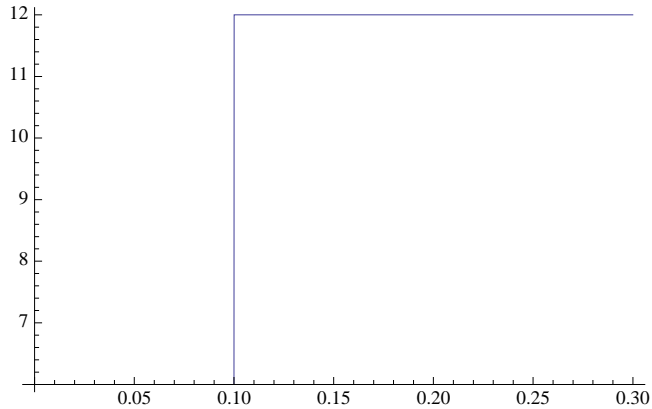


(* ESERCIZIO 4.4.11 *)

```
f1[x_] := x^3 + 1;  
f2[x_] := 1.001 + 0.03 * (x - 0.1) + 0.3 * (x - 0.1)^2 + 2 * (x - 0.1)^3;  
f3[x_] := 1.009 + 0.15 * (x - 0.2) + 0.9 * (x - 0.2)^2 + 2 * (x - 0.2)^3;  
f[x_] := If[x ≤ 0.1, f1[x], If[x ≤ 0.2, f2[x], f3[x]]]  
  
Plot[f'''[x], {x, 0, 0.3}]
```



```
f1[0.1] - f2[0.1]  
f2[0.2] - f3[0.2]
```

0.

-2.22045×10^{-16}

```
f1'[0.1] - f2'[0.1]  
f2'[0.2] - f3'[0.2]
```

6.93889×10^{-18}

2.77556×10^{-17}

```
f1''[0.1] - f2''[0.1]  
f2''[0.2] - f3''[0.2]
```

1.11022×10^{-16}

2.22045×10^{-16}

```
f1'''[0.1] - f2'''[0.1]  
f2'''[0.2] - f3'''[0.2]
```

-6

0

```
f1''''[0.1] - f2''''[0.1]  
f2''''[0.2] - f3''''[0.2]
```

0

0

```
Clear[a, b, x];  
a = 0.0; b = 0.3; n = 4;  
h = (b - a) / n;  
x[0] = a; x[n] = b;  
Do[x[i] = x[i - 1] + h, {i, 1, n - 1}];  
sum = 0.0;  
Do[sum += f[x[i]], {i, 1, n - 1}];  
trap = 0.5 * h * (f[a] + 2.0 * sum + f[b])
```

0.302607

```
i1 = Integrate[f1[x], {x, 0, 0.1}]  
i2 = Integrate[f2[x], {x, 0.1, 0.2}]  
i3 = Integrate[f3[x], {x, 0.2, 0.3}]  
true = i1 + i2 + i3
```

```
0.100025
```

```
0.1004
```

```
0.102
```

```
0.302425
```

```
err = Abs[trap - true]
```

```
0.000182422
```

```
w[0] = 1.; w[n] = 1.;  
Do[w[i] = 4., {i, 1, n - 1, 2}]  
Do[w[i] = 2., {i, 2, n - 2, 2}]  
sum = 0.0;  
Do[sum += w[i] * f[x[i]], {i, 0, n}]  
simps = h * sum / 3.  
err = Abs[simps - true]
```

```
0.302427
```

```
1.5625 × 10-6
```