

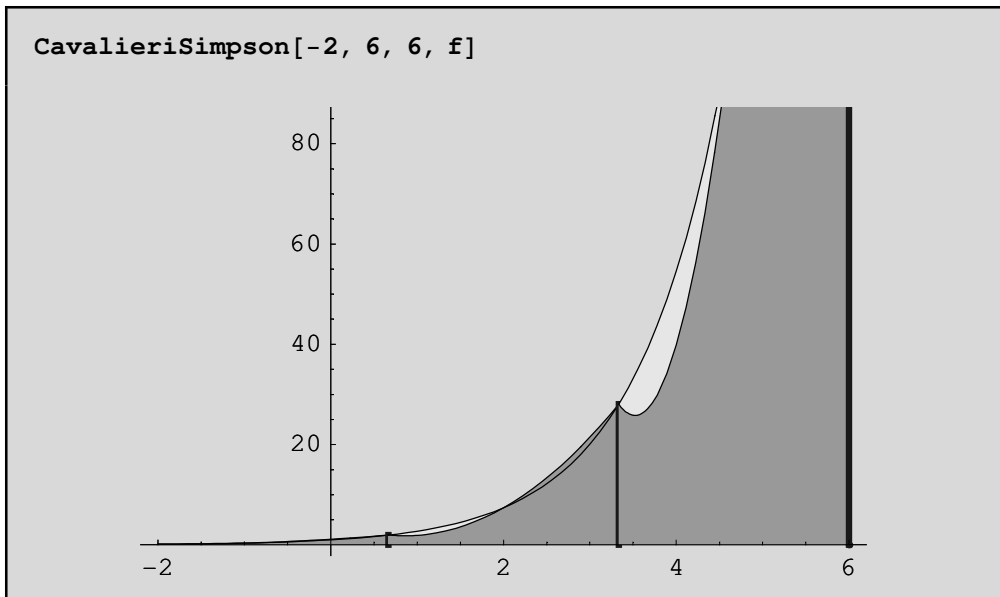
Cavalieri – Simpson method

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```
<< Graphics`FilledPlot`
```

```
f[x_] := Exp[x]
```

```
CavalieriSimpson[a_, b_, n_, f_] :=  
Module[{l, ap, bp, cp, h = (b - a) / n, integrale = 0,  
  xi, xiprec, xim, grafico = {}, sistema, parabola},  
  l = {"xi\ -\ 1", "xim", "xi", "Parabola"}];  
Do[ xi = xiprec + 2 h; xim = xiprec + h;  
  integrale += ((f[xiprec] + f[xi] + 4 f[xim]) / 6);  
  
  sistema = Solve[{ap xi^2 + bp xi + cp == f[xi],  
    ap xiprec^2 + bp xiprec + cp == f[xiprec],  
    ap xim^2 + bp xim + cp == f[xim]}, {ap, bp, cp}];  
  parabola = N[ap x^2 + bp x + cp /. sistema];  
  
  AppendTo[grafico, {FilledPlot[{f[x], parabola},  
    {x, xiprec, xi}, PlotRange -> Automatic, Fills ->  
    {{{1, Axis}, GrayLevel[.9]}}, {{2, 3}, GrayLevel[.6]}},  
    Curves -> Front, DisplayFunction -> Identity],  
    Graphics[{GrayLevel[0.1], Thickness[0.009],  
    Line[{{xi, 0}, {xi, f[xi]}]}]}];  
  
  AppendTo[l, {N[xiprec], N[xim], N[xi], parabola}],  
    {xiprec, a, b - 2 h, 2 h}];  
integrale *= 2 h;  
Show[grafico, DisplayFunction -> $DisplayFunction];  
Print[TableForm[l]];  
Print["Integrale: ", N[ $\int_a^b f[x] dx$ ]];  
Print["Integrale approssimato: ", N[integrale]];  
]
```



x_{i-1}	x_{im}	x_i	Parabola
-2.	-0.666667	0.666667	$1.09855 + 1.07574 x + 0.297066 x^2$
0.666667	2.	3.33333	$4.92754 - 7.31994 x + 4.27535 x^2$
3.33333	4.66667	6.	$789.395 - 433.511 x + 61.5305 x^2$

Integrale: 403.293

Integrale approssimato: 409.113