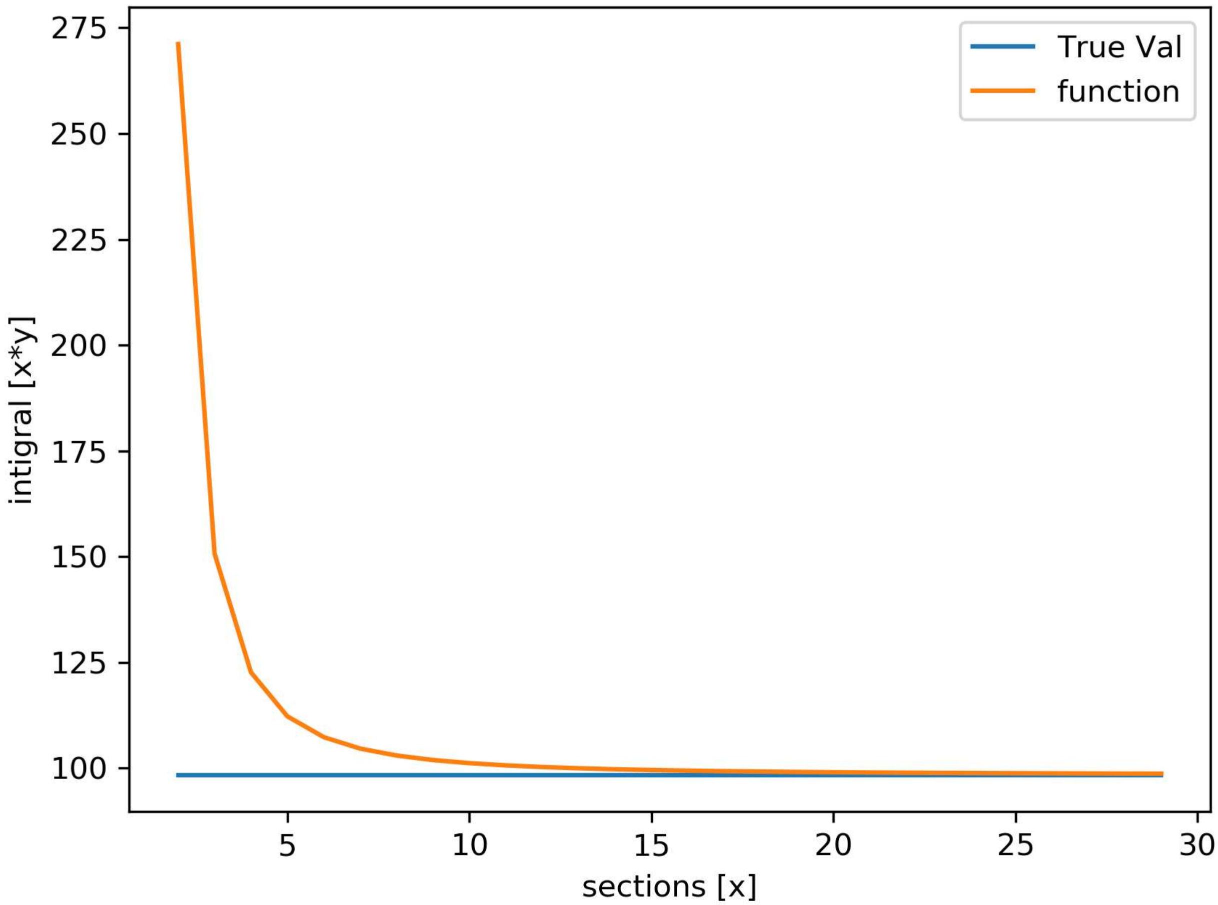
Task 1



Task 2

There's a 0.839583 difference between the values calculated using the Simpson 1/3 an d3/8 rules. I trust both methods but believe the value for the Simpson rule is close to the actual because the curve is has multiple shames and even has a curve making goth tripoidal sum less accurate given the small number of data points.

P2

$x \sim e$	0.00	0.05	0.1	0.15	0.2	0.25
$y \sim s$	40	37.5	43	53	66	55

1/3 3/8 3/8

$$\frac{h}{3}\left(f(x_0)+4f(x_1)+f(x_2)\right) \qquad \frac{3h}{8}\left(f(x_0)+3f(x_1)+3f(x_2)+f(x_3)\right)$$

$h = 0.05$

$$\frac{0.05}{3}\left(40+4(37.5)+43\right) + \frac{3(0.05)}{8}\left(43+3(53)+3(66)+55\right)$$

$$\boxed{=12.4143} \qquad \boxed{\text{Comp} = 11.275}$$

There is a 0.834 diff b/w the python trapezoidal rule and the computational value of 12.4143. I trust both, but I believe the simpson 1/3th & 3/8 equations are the most accurate b/c the ...

Task 3

P3

$$f(x-1) = f(x_i) - f'(x_i)h + \frac{f''(x_i)}{2!}h^2 - \frac{f'''(x_i)}{3!}h^3$$

from taylor series

$O(h^2)$	$f(x-5h)$	$f(x-4h)$	$f(x-3h)$	$f(x-2h)$	$f(x-h)$	$f(x)$
$2hf'$	—	—	—	1	−4	3

$$2hf' = f(x-2h) - 4f(x-h) + 3f(x)$$

$$\boxed{f' = \frac{f(x-2h) - 4f(x-h) + 3f(x)}{2h}}$$

Table

Table

Task 4

P $\frac{dy}{dt} = y t^3 - 1.5y$

$$\frac{dy}{dt} = y\,(t^3 - 1.5)$$

$$y(0) = 1$$

$$\frac{1}{y}\,dy = (t^3 - 1.5)\,dt$$

$$\ln(y) = \frac{t^4}{4} - 1.5t + C$$

$$\boxed{y = ce^{\frac{t^4}{4} - 1.5(t)}}$$

$$y = ce^{\frac{t^4}{4} - 1.5t}$$

$$y = ce^{0-0}$$

$$1 = c(1)$$

$$\underline{c = 1}$$