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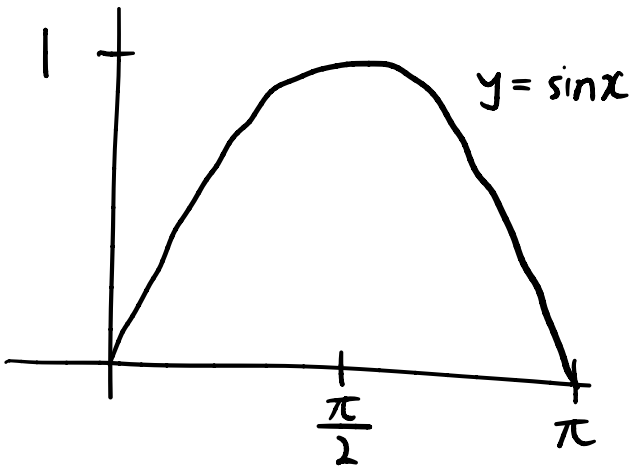
using (a) Trapezoid rule

(b) Simpson's rule

with $n=4$.



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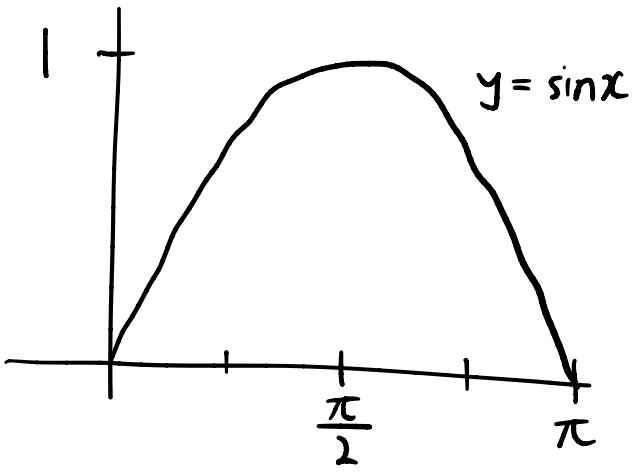

$n=4 \Rightarrow \Delta x = \frac{\pi}{4}$

y_0, y_1, y_2, y_3, y_4

(a) $\int_0^{\pi} \sin x \, dx$

$\approx \Delta x \left(\frac{y_0}{2} + y_1 + y_2 + y_3 + \frac{y_4}{2} \right)$

$= \frac{\pi}{4} \left(0 + \frac{\sqrt{2}}{2} + 1 + \frac{\sqrt{2}}{2} + 0 \right)$

$= \frac{\pi}{4} (1 + \sqrt{2})$

(b) $\int_0^{\pi} \sin x \, dx$

$\approx \frac{\Delta x}{3} (y_0 + 4y_1 + 2y_2 + 4y_3 + y_4)$

$= \frac{\pi}{12} (0 + 2\sqrt{2} + 2 + 2\sqrt{2} + 0)$

$= \frac{\pi}{6} (1 + 2\sqrt{2})$