

5.3 Evaluate the definite integral.

$$\int_0^{\pi} f(x) dx, \text{ where } f(x) = \begin{cases} \sin x + 1 & \text{if } x \leq \pi/2 \\ 2 \cos x + 2 & \text{if } x > \pi/2 \end{cases}$$

- a) $2\pi + 1$
- b) $1.5\pi - 2$
- c) $1.5\pi - 1$
- d) $2\pi - 1$

$$\int_0^{\pi/2} (\sin x + 1) dx + \int_{\pi/2}^{\pi} (2 \cos x + 2) dx$$

$$= \left(-\cos x + x \right) \Big|_0^{\pi/2} + \left(2 \cdot \sin x + 2x \right) \Big|_{\pi/2}^{\pi}$$

$\downarrow \hookrightarrow (-\cos x)' = \sin x$
 $\hookrightarrow (\sin x)' = \cos x$

$$= \left(-\cos \frac{\pi}{2} + \frac{\pi}{2} \right) - \left(-\cos 0 + 0 \right) + \left(2 \sin \pi + 2\pi \right) - \left(2 \sin \frac{\pi}{2} + 2 \cdot \frac{\pi}{2} \right)$$

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

$$= \frac{\pi}{2} + \pi - 1 = 1.5\pi - 1$$