

Homework f

$$1) \int_{-\pi/3}^{\pi/3} \cos x dx = \sin x \Big|_{-\pi/3 \leftarrow Q4}^{\pi/3 \leftarrow Q1} \quad \frac{S/A}{\pi/C}$$

$$\sin(\pi/3) - (\sin^{-\pi/3}) = \sqrt{3}/2 - (-\sqrt{3}/2) = \sqrt{3}/2 + \sqrt{3}/2 = \boxed{\sqrt{3}}$$

$$2) \int_0^{\pi} (2\sin x + \sin 2x) dx$$

$$\int_0^{\pi} 2\sin x dx + \int_0^{\pi} \sin(2x) dx$$

$$2 \int_0^{\pi} \sin x dx + \int_0^{2\pi} \sin u \cdot \frac{1}{2} du$$

$$2 \int_0^{\pi} \sin x dx + \frac{1}{2} \int_0^{2\pi} \sin u du$$

$$-2\cos x \Big|_0^{\pi} + -\frac{1}{2} \cos u \Big|_0^{2\pi}$$

$$-2(\cos \pi - \cos 0) + -\frac{1}{2}(\cos 2\pi - \cos 0)$$

$$-2(-1 - 1) + -\frac{1}{2}(1 - 1) = -2(-2) + -\frac{1}{2}(0) = \boxed{4}$$

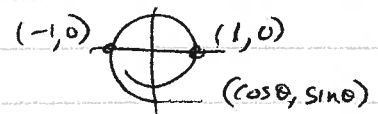
$$3) \int_0^{\pi/2} \cos\left(\frac{2}{3}x\right) dx$$

$$\int_0^{\pi/3} \cos u \cdot \frac{3}{2} du$$

$$\frac{3}{2} \int_0^{\pi/3} \cos u du = \frac{3}{2} \sin u \Big|_0^{\pi/3}$$

$$\frac{3}{2} (\sin \pi/3 - \sin 0) = \frac{3}{2} (\sqrt{3}/2 - 0) = \boxed{\frac{3\sqrt{3}}{4}}$$

$u = 2x$ if $x = \pi$ $u = 2\pi$
 $du = 2dx$ if $x = 0$ $u = 0$
 $\frac{1}{2} du = dx$



$u = \frac{2}{3}x$ if $x = \pi/2$ $u = \pi/3$
 $du = \frac{2}{3}dx$ if $x = 0$ $u = 0$
 $\frac{3}{2} du = dx$

$$4) \int_{\ln \pi/4}^{\ln \pi/3} e^x \cos(e^x) dx$$

$$\begin{aligned} u &= e^x & \text{if } x = \ln \pi/3 & u = \pi/3 \\ du &= e^x dx & \text{if } x = \ln \pi/4 & u = \pi/4 \end{aligned}$$

$$\int_{\pi/4}^{\pi/3} \cos u \, du = \sin u \Big|_{\pi/4}^{\pi/3}$$

$$\sin \pi/3 - \sin \pi/4 = \sqrt{3}/2 - \sqrt{2}/2 = \boxed{\frac{\sqrt{3} - \sqrt{2}}{2}}$$