

1. (a) $\int (e^x + 1) dx = \boxed{e^x + x + C}$ (b) $\int \left(\frac{1}{x} + \sec^2 x + 1\right) dx = \boxed{\ln|x| + \tan x + x + C}$

(c) $\int \frac{1}{1+9x^2} dx + \int \frac{1}{\sqrt{1-x^2}} dx = \int \frac{1}{1+(3x)^2} dx + \arcsin x + C$
 $= \boxed{\frac{1}{3} \arctan(3x) + \arcsin x + C}$

(d) $\int (x+1)(x-2) dx = \int (x^2 - x - 2) dx = \boxed{\frac{x^3}{3} - \frac{x^2}{2} - 2x + C}$

(e) $\int \frac{x^2+x}{\sqrt{x}} dx = \int \frac{x^2}{\sqrt{x}} dx + \int \frac{x}{\sqrt{x}} dx = \int x^{3/2} dx + \int x^{1/2} dx$
 $= \boxed{\frac{2}{5} x^{5/2} + \frac{2}{3} x^{3/2} + C}$

2. $y'(x) = \frac{1}{x^2} + x = x^{-2} + x \Rightarrow y(x) = \frac{x^{-1}}{-1} + \frac{x^2}{2} + C$

$= \frac{x^2}{2} - \frac{1}{x} + C. \quad y(2) = 1 \Rightarrow \frac{2^2}{2} - \frac{1}{2} + C = 1$

$\Rightarrow \frac{3}{2} + C = 1 \Rightarrow C = -\frac{1}{2} \quad \boxed{y(x) = \frac{x^2}{2} - \frac{1}{x} - \frac{1}{2}}$

3. $\Delta x_k = \frac{3-0}{n} = \frac{3}{n}$

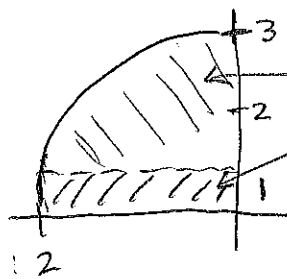
0	$\frac{3}{n}$	$2\frac{3}{n}$	$\dots (k-1)\frac{3}{n}$	$\dots 3$
c_1	c_2	c_3	c_k	

$c_k = \text{left endpoint} = (k-1)\frac{3}{n}$

$f(c_k) = c_k = (k-1)\frac{3}{n} \quad \sum_{k=1}^n f(c_k) \Delta x_k = \sum_{k=1}^n (k-1)\frac{3}{n} \frac{3}{n}$
 $= \boxed{\sum_{k=1}^n (k-1) \frac{9}{n^2}}$

$$4)(a) \int_{-2}^0 (\sqrt{4-x^2} + 1) dx$$

$$= \boxed{\pi + 2}$$

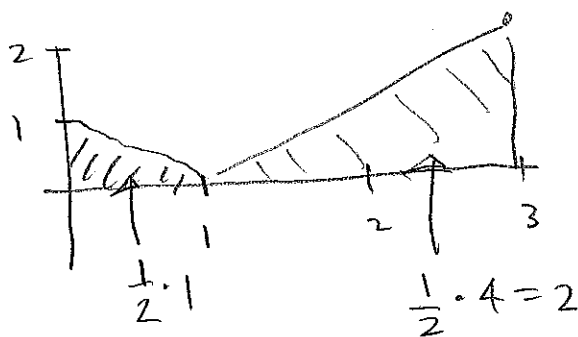


$$= \frac{1}{4} \pi r^2 = \frac{1}{4} \pi (2)^2 = \pi$$

$$1 \cdot 2 = 2$$

$$(b) \int_0^3 |x-1| dx$$

$$= \frac{1}{2} + 2 = \boxed{\frac{5}{2}}$$



$$5(a) \int_0^{\pi} (x + \sin x) dx; \quad = F(\pi) - F(0) = \frac{\pi^2}{2} - 1 - \left(\frac{0^2}{2} - \cos 0 \right)$$

$$F(x) = \frac{x^2}{2} - \cos x$$

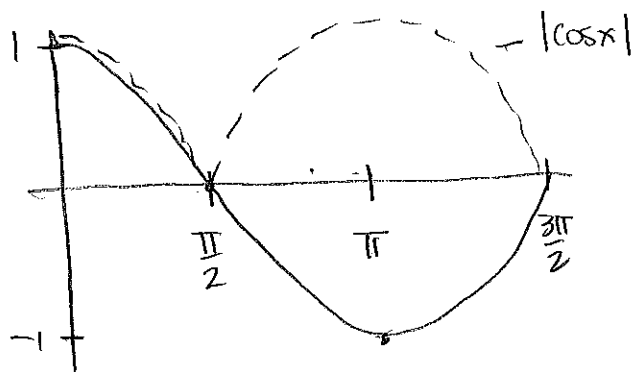
$$= \frac{\pi^2}{2} + 1 + 1 = \boxed{\frac{\pi^2}{2} + 2}$$

$$(b) \int_{-1}^1 (x^2 - 2x + 3) dx = F(1) - F(-1) = \frac{1}{3} - 1 + 3 - \left(-\frac{1}{3} - 1 - 3 \right)$$

$$F(x) = \frac{x^3}{3} - x^2 + 3x$$

$$= \frac{2}{3} + 6 = \boxed{\frac{20}{3}}$$

$$(c) \int_0^{3\pi/2} |\cos x| dx = \int_0^{\pi/2} \cos x dx - \int_{\pi/2}^{3\pi/2} \cos x dx$$



$$F(x) = \sin x$$

$$= F(\frac{\pi}{2}) - F(0) - (F(\frac{3\pi}{2}) - F(\frac{\pi}{2}))$$

$$= 1 - 0 - (-1 - 1)$$

$$= 1 + 1 + 1$$

$$= \boxed{3}$$