1) $\int x^4 - 2x \, dx$

$$\int x^4 dx - \int 2x \, dx = \frac{x^{4+1}}{4+1} - \frac{2x}{2} = \frac{x^5}{5} - \frac{2x^2}{2}$$

$$\boxed{\frac{x^5}{5} - x^2 + C}$$ //

2) $\int \sqrt{x-1}\, dx = \int (x-1)^{\frac{1}{2}} dx = \frac{(x-1)^{\frac{1}{2}+1}}{\frac{1}{2}+1} = \frac{(x-1)^{3/2}}{3/2}$

$$\sqrt{(x-1)^3} \cdot \cancel{2}\,3 = \boxed{\frac{2\sqrt{(x-1)^3}}{3} + C}$$ //

3-) $\int x(x+1)^2 dx = \int x(x^2+2x+1)dx$

$$= \int x^3 + 2x^2 + x \, dx = \int x^3 dx + \int 2x^2 dx + \int x \, dx$$

$$\frac{x^{3+1}}{3+1} + \frac{2x^{2+1}}{2+1} + \frac{x^{1+1}}{1+1} = \boxed{\frac{x^4}{4} + \frac{2x^3}{3} + \frac{x^2}{2} + C}$$ //

4-) $\int \text{sen}(3x)\, dx$

$u = 3x \quad du = 3dx$

$dx = \frac{du}{3}$

$$\int \text{Sen}(u) \frac{du}{3} = \int \text{Sen}(u) \frac{1}{3} du$$

$$\int \frac{1}{3} \int \text{Sen}(u)\, du = \frac{1}{3}(-\text{Cos}(u)) = \frac{1}{3}(-\text{Cos}(3x))$$

$$= \boxed{\frac{-\text{Cos}(3x)}{3} + C}$$ //

tilibra

1- $\int_0^1 x\sqrt{x}\,dx = \int_0^1 x \cdot x^{\frac{1}{2}}\,dx = \int_0^1 x^{\frac{3}{2}}\,dx$

$$= \frac{x^{\frac{3}{2}+1}}{\frac{3}{2}+1}\Bigg]_0^1 = \frac{x^{5/2}}{5/2} = x^{5/2} \cdot \frac{2}{5}\Bigg]_0^1$$

$$= \frac{2x^{5/2}}{5} = \frac{2\sqrt{x^5}}{5}\Bigg]_0^1$$

$$\frac{2\sqrt{1^5}}{5} - \frac{2\sqrt{0^5}}{5} = \frac{2\sqrt{1}}{5} - \frac{2\sqrt{0}}{5}$$

$$= \frac{2.1}{5} - \frac{2.0}{5} = \boxed{\frac{2}{5}}$$

2- $\int_0^{\pi} \frac{\text{sen}\,x\,dx}{2} = \int_0^{\pi} \frac{1}{2}\,\text{sen}(x)\,dx \int_0^{\pi} \frac{\text{sen}(x)\,dx}{2}$

$$\frac{1}{2} \cdot \int_0^{\pi} \text{sen}(x)\,dx = \frac{1}{2}\left(-\cos(x)\right)\Bigg]_0^{\pi} = \frac{-1}{2}\cos(x)\Bigg]_0^{\pi}$$

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

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

(3) $\int_0^{\frac{\pi}{2}} \cos(2x)\,dx$ $\quad u=2x \quad du=2dx \quad dx=\frac{du}{2}$

$$\int_0^{\pi} \cos(u)\frac{du}{2} = \int_0^{\pi} \cos(u)\frac{1}{2}\,du = \frac{1}{2}\int_0^{\pi}\cos(u)du$$

$$\frac{1}{2}\operatorname{Sen}(u)\,du\Big]_0^{\pi} = \frac{\operatorname{Sen}(u)}{2}\Big]_0^{\pi} = \frac{\operatorname{Sen}(\pi)}{2} - \frac{\operatorname{Sen}(0)}{2}$$

$$\boxed{\frac{0}{2} - \frac{0}{2} = 0}$$ //

(4) $\int_0^{2} (3x-1)^3\,dx \to u = 3x-1 \quad du = 3dx \quad dx = \frac{du}{3}$

$$\int_{-1}^{5} u^3\frac{du}{3} = \frac{1}{3}\frac{u^4}{4}\Big]_{-1}^{5} \to \frac{u^4}{12}\Big]_{-1}^{5}$$

$$\frac{5^4}{12} - \frac{(-1)^4}{12} = \frac{625}{12} - \frac{1}{12} = \frac{624}{12} = \boxed{52}$$ //

① $\int x e^{2x}\,dx = x \cdot \frac{e^{2x}}{2} - \int \frac{e^{2x}}{2}\,dx$

$= \frac{x e^{2x}}{2} - \frac{1}{2} \int e^{2x}\,dx$

$\frac{x e^{2x}}{2} - \frac{1}{2} \cdot \frac{e^{2x}}{2} = \frac{x e^{2x}}{2} - \frac{e^{2x}}{4} + c$

$\frac{2x e^{2x} - e^{2x}}{4} = \boxed{\frac{e^{2x}(2x-1)}{4} + c}$

② $\int x^3 \operatorname{Sen}(x)\,dx$

$x^3 \cdot (-\cos(x)) - \int -\cos(x)\, 3x^2\,dx$

$x^2 \cos(x) + 3 \cdot \int \cos(x)\, x^2\,dx$

$-x \cos(x) + 3(x) \operatorname{Sen} x - \int \operatorname{Sen}$

$-x^3 \cos(x) + 3x^2 \operatorname{Sen}(x)$

$-3 \cdot 2 \int x \operatorname{Sen}(x)\,dx = -x^3 \cos(x) + 3x^2 \operatorname{Sen}(x) - 6$

$\int x(-\cos(x)) - \int -\cos(x)\,dx$

$= -x^3 \cos(x) + 3x^2 \operatorname{Sen}(x) + 6x\cos(x) - 6\operatorname{sen}(x)$

$= (-x^3 + 6x)\cos(x) + (3x^2 - 6)\operatorname{Sen}(x) + C$

(3) $\int x \cos(2x)\,dx = \dfrac{x \operatorname{sen}(2x)}{2} - \dfrac{\int \operatorname{sen}(2x)\,dx}{2}$

$\dfrac{x \operatorname{sen}(2x)}{2} - \dfrac{1}{2} \int \operatorname{sen}(2x)\,dx = \dfrac{x \operatorname{sen}(2x)}{2}$

$-\dfrac{1}{2} \dfrac{(-\cos(2x))}{2} = \boxed{\dfrac{x \operatorname{sen}(2x)}{2} + \dfrac{\cos(2x)}{4} + C}$ //

(4) $\int x^3 \ln(x)\,dx = \quad u = \ln(x) \quad du = \frac{1}{x}\,dx$

$dv = x^3\,dx$

$v = \dfrac{x^4}{4}$

$\int \ln(x)\, x^3\,dx \to \ln(x) \cdot \dfrac{x^4}{4} - \int \dfrac{x^4}{4} \cdot \dfrac{1}{x}\,dx$

$= \dfrac{x^4 \ln(x)}{4} - \dfrac{1}{4} \int x^3\,dx = \dfrac{x^4 \ln(x)}{4} - \dfrac{1}{4} \cdot \dfrac{x^4}{4}$

$\dfrac{x^4 \ln(x)}{4} - \dfrac{x^4}{16} = \dfrac{4 \cdot x^4 \ln(x) - x^4}{16}$

$\boxed{x^4 \dfrac{(4 \ln(x) - 1)}{16} + C}$ //