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Subject # Applied Calculus

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①

Question # 1)

$$= \int_2^3 t \sin^2 t \, dt$$

$$= \int_2^3 t (\sin t) \, dt$$

$$= \int_2^3 t \, dt \int (\sin t) \, dt$$

$$= \int_2^3 t \, dt \int (\sin t) \, dt$$

$$= \int_2^3 \frac{t+1}{2} \int (\sin t) \, dt$$

$$= \int_2^3 \frac{t^2}{2} \cdot (-\cos t) \, dt + C$$

$$= \frac{1}{2} \int_2^3 t^2 \cdot (-\cos t) \, dt$$

$$= \frac{1}{2} \cdot (3)^2 - (2)^2 \cdot (-\cos t) + C$$

$$= \frac{1}{2} \cdot 9 - 4 \cdot (-\cos t) + C$$

$$= \frac{1}{2} \cdot 5 \cdot (-\cos t) + C$$

②

$$\frac{5}{2} (-\cos u) + c$$

$$-\frac{5}{2} \cos u + c$$

(3)

Question #2

$$\int_0^1 \frac{4t^2 \cdot 2t^2(3t-1)}{2t^2 \cdot 1}$$

$$\int_0^1 \frac{2t^2(2t-1) + 1(3t-1)}{2t^2 \cdot 1}$$

$$\int_0^1 \frac{\cancel{2t^2} \cdot (2t-1) + (3t-1)}{\cancel{2t^2} \cdot 1}$$

$$\int_0^1 (2t-1)(3t-1)$$

$$\int_0^1 6t^2 - 2t - 3t + 1$$

$$= \int_0^1 6t^2 - 5t + 1$$

$$= \int_0^1 6t^2 dt - \int_0^1 5t dt + \int_0^1 1 dt$$

$$= \int_0^1 \frac{6t^3}{3} - \int_0^1 \frac{5t^2}{2} + C$$

$$= \int_0^1 \frac{6t^3}{3} + \int_0^1 \frac{5t^2}{2} + C$$

(4)

ft

$$= b \left(\frac{11^3}{3} - \frac{10^3}{3} \right) - s \left(\frac{12^2}{2} - \frac{10^2}{2} \right)$$

$$= b \left(\frac{1}{3} - 0 \right) - s \left(\frac{1}{2} - 0 \right)$$

$$= b \left(\frac{1}{3} \right) - s \left(\frac{1}{2} \right)$$

$$= \frac{2}{3} - \frac{5}{2}$$

$$= \frac{2}{3} - \frac{5}{2} = \frac{4-15}{6}$$

$$= -\frac{11}{6}$$