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UAS : Kalkulus Lanjut

No 2

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1).

2).  $\int \frac{(1+2x)^2}{\sqrt{x}} dx = \int \frac{1}{\sqrt{x}} dx + \int 4\sqrt{x} dx + \int 4x^{3/2} dx$

$\Rightarrow \int \frac{1}{\sqrt{x}} dx = \int x^{-1/2} dx = \int x^{-1/2} dx = 4 \int \sqrt{x} dx = 4 \int x^{1/2} dx$

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

$= \frac{4 \cdot x^{1}}{1} + C$

$= 4x + C$

$= 2\sqrt{x} + C$

$\Rightarrow \int 4x^{3/2} dx = 4 \cdot \frac{x^{3/2+1/2}}{3/2+1/2} + C$

$= 4 \cdot \frac{x^2}{5/2} + C$

$= 4 \cdot \frac{2}{5} x^2 + C$

$= \frac{8}{5} x^2 + C$

Jadi,  $\int \frac{(1+2x)^2}{\sqrt{x}} dx = \int \frac{1}{\sqrt{x}} dx + \int 4\sqrt{x} dx + \int 4x^{3/2} dx$

$= 2\sqrt{x} + \frac{8}{3} x^{3/2} + \frac{8}{5} x^{5/2} + C$

No 3 a

$$1) a) \int_1^4 |t^2 - t - 6| dt \Rightarrow t^2 - t - 6 = 0$$

$$(t-3)(t+2)$$

$$t-3=0 \text{ dan } t+2=0$$

$$t=3 \quad t=-2$$

$$\int_1^3 t^2 - t - 6 dt + \int_3^4 t^2 - t - 6 dt$$

$$= \int_1^3 t^2 - t - 6 dt = \left[ \frac{t^3}{3} - \frac{t^2}{2} - 6t \right]_1^3$$

$$= \left( \frac{3^3}{3} - \frac{3^2}{2} - 6(3) \right) - \left( \frac{1^3}{3} - \frac{1^2}{2} - 6(1) \right)$$

$$= \left( \frac{27}{3} - \frac{9}{2} - 18 \right) - \left( \frac{1}{3} - \frac{1}{2} - 6 \right)$$

$$= \frac{27}{3} - \frac{9}{2} - 18 - \frac{1}{3} + \frac{1}{2} + 6$$

$$= \frac{26}{3} - \frac{8}{2} - 14$$

$$= \frac{26}{3} - 4 - 14$$

$$= -\frac{22}{3}$$

$$= \int_3^4 t^2 - t - 6 dt = \left[ \frac{t^3}{3} - \frac{t^2}{2} - 6t \right]_3^4$$

$$= \left( \frac{4^3}{3} - \frac{4^2}{2} - 6(4) \right) - \left( \frac{3^3}{3} - \frac{3^2}{2} - 6(3) \right)$$

$$= \left( \frac{64}{3} - \frac{16}{2} - 24 \right) - \left( \frac{27}{3} - \frac{9}{2} - 18 \right)$$

$$= \frac{64}{3} - \frac{27}{3} - \frac{16}{2} + \frac{9}{2} - 24 + 18$$

$$= \frac{37}{3} - \frac{7}{2} - 6$$

$$= \frac{74 - 21 - 36}{6}$$

$$= \frac{17}{6}$$

$$\text{Jadi} : \int_1^4 |t^2 - t - 6| dt = \int_1^3 t^2 - t - 6 dt + \int_3^4 t^2 - t - 6 dt$$

$$= -\frac{22}{3} + \frac{17}{6} = \frac{-44 + 17}{6}$$

$$= \frac{-27}{6} = -\frac{9}{2}$$

No 4 a

3) b).

$$\begin{aligned} 4). 9). \int_1^5 \frac{x}{\sqrt{2x-1}} dx &= \frac{x}{(2x-1)^{1/2}} \quad \text{misal } u = 2x-1 \\ &\quad \frac{du}{dx} = 2 \\ &\quad du = 2 dx \\ &= 2 \int_1^5 \frac{1}{u^{1/2}} du \\ &= 2 \cdot \frac{u^{-1/2+1/2}}{-1/2+1/2} \Big|_1^5 \\ &= 2 \left( \frac{u^{1/2}}{1/2} \right) \Big|_1^5 \\ &= 2 \left( \frac{(2x-1)^{1/2}}{1/2} \right) \Big|_1^5 \\ &= 2 \left( \frac{2(5-1)^{1/2}}{1/2} \right) - \left( \frac{2(1-1)^{1/2}}{1/2} \right) \\ &= 2 \cdot \left( \frac{2 \cdot (4)^{1/2}}{1/2} \right) - (0) \\ &= 2 \cdot \left( \frac{8^{1/2}}{1/2} \right) \\ &= 2 \cdot 2 \cdot 8^{1/2} \\ &= 4 \cdot 8^{1/2} \\ &= 4 \cdot \sqrt{8} \\ &= 4\sqrt{8} \end{aligned}$$