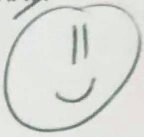


97

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I. Determine if the following propositions are True (T) or False (F) (5 points each):

1. (T) Having $\int (\sin x + \cos x) dx$ is the same as having $\int (\sin x) dx + \int (\cos x) dx$
2. (F) The answer for $\int 6 \frac{\csc(3x)}{\sin(3x)} dx$ is $-2 \cot(3x) + C$
3. (F) $\int x(x^2 + 3)^2 dx = \frac{1}{6} (x^2 + 3)^3 + C$
4. (F) $\int (x^2 - 3) \tan(x^2 - 3x) dx = -\ln |\cos(x^2 - 3x)| + C$
5. (F) The integral of $\int (2 \sin 3x + 3x) dx$ is $-6 \sin 3x + 3 + C$

II. Solve the following exercises, show ALL your procedure and frame your final answer. (15 points each).

If the equation of acceleration of an object is $a(t) = \frac{3}{t-4}$ and the velocity at $t=5$ is 8 m/s, then find the equation that determines the velocity of the object at any time 't'.

$$a(t) = \frac{3}{t-4} = \frac{3}{t-4} \cdot dt$$

$$v(t) = 3(t-4)^2$$

$$v(t) = \frac{1}{3} \ln(t-4) + C$$

$$8 = \frac{1}{3} \ln(5-4) + C \rightarrow C = 8$$

$$v(t) = \frac{1}{3} \ln(t-4) + 8$$

III. Find the antiderivative or integral of the following problems. SHOW YOUR ENTIRE PROCEDURE. (15 pts each)

$$1- h(x) = 96 \sin^2(2x + \pi) \cos(2x + \pi)$$

$$H(x) = \int 96 (\sin(2x + \pi))^2 \cos(2x + \pi) dx$$

$$H(x) = \frac{96}{2} \int (\sin(2x + \pi))^2 \cos(2x + \pi) dx$$

$$H(x) = \frac{48}{3} \sin^3(2x + \pi) + C$$

$$H(x) = 16 \sin^3(2x + \pi) + C$$

$$2. \quad v(t) = \frac{e^{5t}}{3t^2} =$$

$$x(t) = \frac{e^{5t}}{3t^2} \quad dv = -\frac{5}{t^2} dt$$

$$\frac{1}{3} \left(\frac{1}{5} \right) \left(-\frac{5}{t^2} \right) dt$$

$$x(t) = \frac{e^{5t}}{15t^2} + C$$

$$v(t) = -e^t$$

$$3. \quad \int 3x \cot(6x^2 - 1) \sin(6x^2 - 1) dx$$

$$\int 3x \frac{1}{\tan(6x^2 - 1)} |\sin(6x^2 - 1)| dx =$$

$$\int 3x \frac{\sin(6x^2 - 1)}{\tan(6x^2 - 1)} dx =$$

$$\int 3x \cos(6x^2 - 1) dx =$$

$$\frac{1}{4} \int \frac{1}{2} \cos(6x^2 - 1) dx = \int \frac{1}{4} \sin(6x^2 - 1) + C$$

$$4. \quad \int 7 \sec(3x) \tan(3x) dx$$

$$u = 3x$$

$$\frac{7}{3} \int 3 \sec(3x) \tan(3x) dx =$$

$$\frac{7}{3} \sec(3x) + C$$

If the equation of acceleration of an object is $a(t) = \frac{3}{t-4}$ and the velocity at $t=5$ is 8 m/s, then find the equation that determines the velocity of the object at any time t .

$$a(t) = \frac{3}{t-4}$$

$$v(t) = 3 \ln|t-4| + C$$

$$8 = 3 \ln|5-4| + C \rightarrow C = 8$$

$$v(t) = 3 \ln|t-4| + 8$$