AP Calculus AB- Chapter 8-9 Review

1) $\frac{dy}{dx} = 2y^2$ $y=-1, x=1$ $x=2, y=?$

$\int \frac{1}{y^2}\,dy = \int 2\,dx \rightarrow \int y^{-2}\,dy = \int 2\,dx \rightarrow -\frac{1}{y} = 2x + C$ plug in point

$1 = 2 + C$ $C = -1$

$-\frac{1}{y} = 2x - 1$ plug in $x=2$

$-\frac{1}{y} = 4 - 1 \rightarrow -1/y = 3 \rightarrow \boxed{y = -1/3}$ B.

2) omit

3) $v(t) = et$

$\int_0^2 |e^t| \quad t=0 \quad t=2$

$\rightarrow e^t|_0^2 = e^2 - e^0 = \boxed{e^2 - 1}$ A

4) $\frac{dy}{dx} = 3x^2y$ $(0, 8)$

$\int \frac{1}{y}\,dy = \int 3x^2\,dx \rightarrow \ln|y| = x^3 + 3 + c \rightarrow \ln 8 = 3 + C \rightarrow C = \ln 8 - 3$

$\ln|y| = x^3 + 3 + \ln 8 - 3 \rightarrow \ln|y| = x^3 + \ln 8$

$\boxed{|y| = e^{x^3} \cdot 8}$ A

5) $y = -5t^2$ $0 \le t \le 3$

$\frac{f(b) - f(a)}{b - a} = \frac{f(3) - f(0)}{3} = \frac{-45 - 0}{3} = \boxed{-15}$ C

6) $\frac{dy}{dx} = \cos(2x) \rightarrow y = \int \cos(2x)\,dx$ $u = 2x$ $du = 2$

$y = \frac{1}{2}\sin u + C \rightarrow \boxed{y = \frac{1}{2}\sin 2x + C}$ C

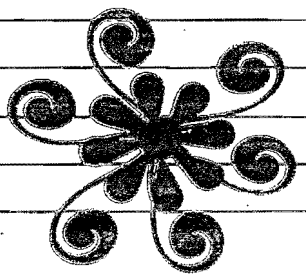
7) $\frac{dy}{dx} = 4y$ $y = 4$ when $x = 0$, $y =$

$\frac{1}{y}\,dy = 4\,dx \rightarrow \ln|y| = 4x + c \rightarrow \ln 4 = c$

$\ln|y| = 4x + \ln 4$

$|y| = e^{4x} \cdot 4$

$\boxed{y = 4e^{4x}}$ A



⑧ $y = 8t - 3t^2$ $\quad t=1, t=2$

$y' = 8 - 6t = 0$

$t = 4/3$

$y(1) = 5$ → 1

$y(4/3) = 16/3$ → $1\frac{1}{3}$

$y(2) = 4$

$\frac{1\frac{1}{3}}{1} = \frac{5}{3}$ (C)

⑨ $a = 8 - 6t$

$v = \int 8 - 6t =$

$v = 8t - 3t^2 + C$

$t=1 \; v=25$

$v(1) = 8(1) - 3(1)^2 + C = 25$

$8 - 3 + C = 25$

$C = 20$

$v(t) = 8t - 3t^2 + 20$

$s(4) - s(2)$

$s(t) = \int v(t)$

$= 4t^2 - t^3 + 20t + C$

$s(4) - s(2) =$

$= (64 - 64 + 80 + C) - (16 - 8 + 40 + C)$

$= 80 - 48 = 32$ (D)

⑩ $\frac{dy}{dx} = \frac{-x}{y e^{x^2}}$ $\quad (0,2)$

$\int \frac{1}{y}\, dy = \int -x e^{-x^2}$ $\quad u = -x^2$, $du = -2x$

$\frac{y^2}{2} = \frac{1}{2} e^{-x^2} + C$

$\frac{4}{2} = \frac{1}{2} + C \quad C = 3/2$

$\frac{y^2}{2} = \frac{1}{2} e^{-x^2} + \frac{3}{2}$

$y^2 = e^{-x^2} + 3$

$y = \sqrt{e^{-x^2} + 3}$ (D)

⑪ $a(t) = 2t + 1$ $\quad (0,0)$

$v(t) = \int 2t + 1\, dt$

$v(t) = t^2 + t + C \quad (0,0)$

$s(t) = \int v(t) = \frac{2}{3}t^3 + \frac{1}{2}t^2 + C$

$s(0) = 0$

$s(2) = 32$ → 32 (A)

⑫ $\frac{dy}{dx} = \tan x \rightarrow \int dy = \int \tan x\, dx \rightarrow y = \int \frac{\sin x}{\cos x} + C$ $\quad u = \cos x$, $du = -\sin x$

This is what I gave you

$-\int \frac{1}{u}\, du = \boxed{-\ln|\cos x| + C} \rightarrow \ln|\cos x|^{-1} + C \rightarrow$

$\boxed{\ln|\sec x| + C}$ C

memorize or do substitution