1) $$\int_{1/50}^{2} \frac{e^{2/w}}{w^2}\, dw$$

let $t = \frac{2}{w}$

$$-\frac{dt}{2} = \frac{dw}{w^2}$$

$$-\frac{1}{2}\int_{1/50}^{2} e^t\, dt$$

$$-\frac{1}{2}\left[e^t\right]_{1/50}^{2}$$

$$-\frac{1}{2}\left[e^2 - e^{1/50}\right]$$

$= -3.1844$ Ans.

2) $$\int \frac{2t^3+1}{(t^4+2t)^3}\, dt$$

let $x = t^4+2t$

$$\frac{dx}{dt} = 4t^3+2$$

$$\frac{dx}{2} = (2t^3+1)dt$$

$$\frac{1}{2}\int \frac{dx}{x^3}$$

$$= \frac{1}{2}\times\frac{x^{-2}}{-2} + c$$

$$= -\frac{x^{-2}}{4} + c$$ Ans.

3) $f'(x) = \cancel{8}\, x^4 + 3x - 9$

$$f(x) = \frac{x^5}{5} + \frac{3x^2}{2} - 9x$$

4) $$f(x) = \begin{cases} 6 & x > 1 \\ 3x^2 & x \leq 1. \end{cases}$$

$$\int_{-2}^{3} f(x)\, dx.$$

$$\int_{-2}^{1} 3x^2\, dx + \int_{1}^{3} 6\, dx.$$

$$\left[\cancel{3} \frac{x^3}{\cancel{3}} \right]_{-2}^{1} + 6 \left[x \right]_{1}^{3}$$

$$= 1 + 8 + 6 \times 2$$

$$= 21$$ उत्तर।

5) $$\int 3(8y - 1)\, e^{4y^2 - y}\, dy.$$

Let $4y^2 - y = x$

$$\frac{dx}{dy} = 8y - 1$$

$$\int 3 e^{x}\, dx$$

$$= 3e^{x} + c.$$

$$= 3e^{4y^2 - y} + c$$ उत्तर।

6) $f''(x) = 15\sqrt{x} + 5x^3 + 6$

$f'(x) = \cancel{15}^{5} \times \frac{2}{\cancel{3}} x^{3/2} + 5\frac{x^4}{4} + 6x + c_1$

$\cancel{f(x) = 10\,x^{3/2}}$

$f(x) = 10 \times \frac{2}{5} \times x^{5/2} + \frac{5}{4} \times \frac{x^5}{5} + \frac{6x^2}{2} + c_1x + c_2$

$f(x) = 4x^{5/2} + \frac{x^5}{4} + 3x^2 + c_1x + c_2$

$f(1) = -5/4 = 4 + \frac{1}{4} + 3 + c_1 + c_2$

$-5/4 = 7 + \frac{1}{4} + c_1 + c_2$

$c_1 + c_2 = -\frac{17}{2}$ — ①

$f(4) = 404 = 128 + \cancel{\frac{1024}{4}}\ 256 + 48 + 4c_1 + c_2$

$4c_1 + \cancel{c_2} = -28$ — ②

$c_1 + \cancel{c_2} = -17/2$

$-\quad -\quad +$

$3c_1 = -\frac{39}{2}$

$c_2 = -2$ Ans. $\quad c_1 = -\frac{13}{2}$ Ans.

7) $f(x+iy) + g(x-iy)$

$\Rightarrow f(x) + g(x) + i f(y) - i g(y)$

8) $\frac{dr}{d\theta} = \frac{r^2}{\theta}$

$r = -\frac{1}{\log(\theta)}$ Ans.

9) $\frac{dv}{dt} = 9.8 - 0.196v$

$\log(9.8 - 0.196v) = 0.196t + c$

12) $f(x) = x^3 - 10x^2 + 6$ for $x=3$

$f(x) = -57 + (x-3)(-33) + \frac{(x-3)^2}{2}(-2) + \frac{(x-3)^3}{6}(6)$

$f(3) = -57 \quad f'(3) = -33$

$f''(3) = -2 \quad f'''(3) = 6$

14) $f(x) = \sqrt{1+x}$

$f'(0) = 1/2 \quad f'(0) = -1/4 \quad f''(0) = -3/8$

$\sqrt{1+x} = \sqrt{1+x} + \left(\frac{1}{2}\right)(x) + \frac{x^2}{2}\left(-\frac{1}{4}\right) + \frac{x^3}{3!}\left(\frac{-3}{8}\right)$

16) $f(x) = \ln(3+4x)$

$f(0) = \ln(3)$ $\quad f'(0) = 4/3$

$$\ln(3+4x) = \ln(3) + x\left(4/3\right) + \frac{x^2}{2}(-1)(4)^2 (3)^{-2}$$