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1 a) $\int_{-3}^{3} 9 - x^2\,dx = 9x - \frac{x^3}{3}\Big|_{-3}^{3} = 9.3 - \frac{3^3}{3} - \left(9.(-3) - \frac{(-3)^3}{3}\right)$

$27 - \frac{27}{3} - \left(-27 - \frac{(-27)}{3}\right) = 27 + 27 - \frac{27}{3} - \frac{27}{3} =$

$54 - \frac{54}{3} = 54 - 18 = 36$ //

1 b) $\int_{2}^{3} 2x - 6 - (x^2 - 3x) = \int_{2} -x^2 + 5x - 6\,dx$

$-\frac{x^3}{3} + \frac{5x^2}{2} - 6x\Big|_{2}^{3} = -\frac{27}{3} + \frac{45}{2} - 18 - \left(-\frac{8}{3} + \frac{20}{2} - 12\right)$

$-\frac{27}{3} + \frac{8}{3} + \frac{45}{2} - \frac{20}{2} - 18 + 12 = -\frac{19}{3} + \frac{25}{2} - 6$

$\frac{-38 + 75 - 36}{6} = \frac{-74 + 75}{6} = \frac{1}{6}$ //

2) a) $\int_1^4 (x^2 - 3x + 2)\,dx$

$$\frac{x^3}{3}\Big|_1^4 - \frac{3x^2}{2}\Big|_1^4 + 2x\Big|_1^4$$

$$\left[\frac{4^3}{3} - \frac{1^3}{3}\right] - \left[3.\frac{4^2}{2} - 3.\frac{1^2}{2}\right] + [8-2]$$

$$\left[\frac{64}{3} - \frac{1}{3}\right] - \left[24 - \frac{3}{2}\right] + 6$$

$$21 - \frac{45}{2} + 6 = \frac{9}{2} \text{ u.a} //$$

2) b) $\int_0^1 x\sqrt{x^2+1}\,dx$

$$\int_0^1 x . u^{1/2} \frac{d.u}{2x} \rightarrow \frac{1}{2}\int_0^1 x . \sqrt{u}$$

$$\frac{1}{2} . \frac{u^{3/2}}{3/2}\Big|_0^1 \rightarrow \frac{1}{3} . (x^2+1)^{3/2}\Big|_0^1$$

$$\frac{(1^2+1)^{3/2}}{3} - \frac{(0^2-1)^{3/2}}{3}$$

$$\frac{\sqrt{2^3}}{3} - \frac{\sqrt{1^3}}{3} \rightarrow \frac{\sqrt{2^3}-1}{3} = \frac{2\sqrt{2}-1}{3} \text{ u.a} //$$

3) a) $\int e^{3x} \cdot \operatorname{sen} x \, dx$ $\quad u = \operatorname{sen} x \quad du = \cos x \, dx$

$dv = e^{3x} dx \quad v = \frac{1}{3} e^{3x}$

$\int u \cdot dv = u \cdot v - \int v \cdot du$

$u = \cos x \quad du = -\operatorname{sen} x$

$dv = e^{3x} dx \quad v = \frac{1}{3} e^{3x}$

$\frac{1}{3} e^{3x} \cdot \operatorname{sen} x - \int \frac{1}{3} e^{3x} \cdot \cos x \, dx$

$\int e^{3x} \operatorname{sen} x \, dx = \frac{1}{3} e^{3x} \cdot \operatorname{sen} x - \frac{1}{3}\left[\frac{1}{3} e^{3x} \cos x \cdot \int \frac{-1}{3} e^{3x} \operatorname{sen} x \, dx\right]$

$\int e^{3x} \operatorname{sen} x \, dx = \frac{1}{3} e^{3x} \cdot \operatorname{sen} x \cdot \frac{1}{9} e^{3x} \cos x \cdot \frac{1}{9} \int e^{3x} \operatorname{sen} x \, dx$

$\int e^{3x} \operatorname{sen} x \, dx + \frac{1}{9} \int e^{3x} \operatorname{sen} x \, dx = \frac{1}{3} e^{3x} \operatorname{sen} x - \frac{1}{9} e^{3x} \cos x + C$

$\int e^{3x} \operatorname{sen} x \, dx = \frac{9}{10}\left[\frac{1}{3} e^{3x} \operatorname{sen} x \cdot \frac{1}{9} e^{3x} \cos x\right] + C$

$\int e^{3x} \operatorname{sen} x \, dx = \boxed{\frac{3 e^{3x} \cdot \operatorname{sen} x - \cos x \cdot e^{3x}}{10} + C}$

3 b) $\int x^2 e^{-x}\, dx$ $\qquad u = x^2 \qquad du = 2x\,dx$

$\qquad dv = e^{-x}dx \qquad V = e^{-x}$

$\int u\, dv = u . V - \int V . du$

$\int x^2 . e^{-x}\, dx = x^2 . e^{-x} - \int -e^{-x} . 2x\, dx$

$x^2 . (-e^{-x} - (-2)) . \int e^{-x} . x\, dx$ $\qquad u = x \qquad du = 1$

$\qquad dV = e^{-x} dx \qquad V = -e^{-x}$

$x^2 . (-e^{-x} + 2) . \int x e^{-x} . dx$

$x^2 . (-e^{-x} + 2) . [x . (-e^{x}) + \int +e^{-x}\, dx]$

$x^2 . (-e^{-x} + 2) . [x . (-e^{-x}) - e^{-x}]$

$-x^2 e^{-x} - 2x e^{-x} - 2e^{-x} + C$

4 a) $x^2 + 1 = 3 - x^2$

$2x^2 = 2$

$x^2 = 1$

$x = \pm 1$

$\int_{-1}^{1} 3 - x^2 - x^2 - 1 = \int_{-1}^{1} -2x^2 + 2 =$

$\left. \frac{-2x^3}{3} + 2x \right|_{-1}^{1} = \frac{-2.(1)^3}{3} + 2.1 - \left(\frac{-2.(-1)^3}{3} + 2.(-1) \right)$

$\frac{-2}{3} + 2 - \left(\frac{2}{3} - 2 \right) = \frac{-4}{3} + 4 = \frac{-4 + 12}{3} = \frac{8}{3}$

4 b) $\int_0^3 -x^2+3x + \int_3^4 x^2-3x =$

$$-\frac{x^3}{3}+\frac{3x^2}{2}\Big|_6^3 + \frac{x^3}{3}-\frac{3x^2}{2}\Big|_3^4 =$$

$$-\frac{27}{3}+\frac{27}{2}+\frac{64}{3}-\frac{48}{2}-\frac{27}{3}+\frac{27}{2}=\frac{64}{3}-\frac{54}{3}+\frac{54}{2}-\frac{48}{2}=$$

$$\frac{10}{3}+\frac{6}{2}=\frac{38}{6}=\frac{19}{3}$$ //