SET 2 – Solutions

① $u = x^2 + 2x + 3$

$du = (2x + 2)dx$

$dx = \frac{du}{2x+2}$

$\int e^u du = e^u + c$

$$\boxed{e^{x^2+2x+3} + c}$$

② $u = x^3 + 3x$

$du = (3x^2 + 3)dx$

$dx = \frac{du}{3(x^2+1)}$

$$\frac{1}{3}\int \frac{1}{u}\, du = \boxed{\frac{1}{3}\ln|x^3+3x| + c}$$

③ $u = x^2 + 5x$

$du = (2x + 5)dx$

$$\int u^7\, du = \boxed{\frac{(x^2+5x)^8}{8} + c}$$

④ $\int (3-x)^{10}\, dx$

minisub

$$\boxed{-\frac{(3-x)^{11}}{11} + c}$$

⑤ $\frac{1}{7}\int u^{1/2}\, du$

$\frac{1}{7}(7x+9)^{3/2} \cdot \frac{2}{3} + c$

$$\boxed{\frac{2}{21}(7x+9)^{3/2} + c}$$

⑥ $u = 1 + x^4$

$du = 4x^3 dx$

$dx = \frac{du}{4x^3}$

$\frac{1}{4}\int u^{-1/3}\, du = \frac{1}{4} u^{2/3} \cdot \frac{3}{2} + c$

$$= \boxed{\frac{3}{8}(1+x^4)^{2/3} + c}$$

⑦ $$\boxed{\frac{1}{5}e^{(5x+2)} + c}$$

⑧ $$\boxed{\frac{4}{3}\sin(3x) + c}$$

⑨ $u = \ln x$

$du = \frac{dx}{x}$

$dx = x\, du$

$$\int \sin(u)\, du = \boxed{-\cos(\ln x) + c}$$

(10) $3\int \frac{x+2}{x^2+4x-3}\,dx = \frac{3}{2}\int \frac{1}{u}\,du = \boxed{\frac{3}{2}\ln|x^2+4x-3|+C}$

$u = x^2+4x$

$du = (2x+4)\,dx$

$dx = \frac{du}{2(x+2)}$

(11) $u = x^2+1$

$du = 2x\,dx$

$dx = \frac{du}{2x}$

$\frac{1}{2}\int 3^u\,du = \frac{1}{2}\,3^u \cdot \frac{1}{\ln 3} + C$

$= \boxed{\frac{3^{(x^2+1)}}{2\ln 3} + C}$

(12) $\int \frac{3}{x\ln x}\,dx = \int \frac{3}{u}\,du = \boxed{3\ln|\ln x| + C}$

$u = \ln x$

$du = \frac{1}{x}$

$dx = x\,du$

(13) $u = \sin(5x)$

$du = 5\cos(5x)\,dx$

$dx = \frac{du}{5\cos(5x)}$

$\frac{1}{5}\int e^{-u}\,du = \boxed{-\frac{1}{5}e^{-(\sin(5x))} + C}$

(14) $\int x\sin(x^2)\,dx$

$u = x^2$

$du = 2x\,dx$

$dx = \frac{du}{2x}$

$= \frac{1}{2}\int \sin(u)\,du = \boxed{-\frac{1}{2}\cos(x^2) + C}$