1a/ $\int (2x+3)^2 \, dx$

$\frac{1}{3}(2x+3)^3 \cdot \frac{1}{2} + C$

$\frac{1}{6}(2x+3)^3 + C$

b/ $\int 2(5x-1)^{-3} \, dx$

$-(5x-1)^{-2} \cdot \frac{1}{5} + C$

$-\frac{1}{5}(5x-1)^{-2} + C$

2a/ $\int (5x-3)^{\frac{1}{2}} \, dx$

$\frac{2}{3}(5x-3)^{\frac{3}{2}} \cdot \frac{1}{5} + C$

$\frac{2}{15}(5x-3)^{\frac{3}{2}} + C$

b/ $\int e^{2x+3} \, dx$

$\frac{1}{2} e^{2x+3} + C$

3a/ $\int e^{3-x} \, dx$

$-e^{3-x} + C$

b/ $\int \frac{1}{2x+1} \, dx$

$\frac{1}{2} \ln|2x+1| + C$

4/ $\int_1^2 \frac{2}{3x+5}\,dx$

$\left[\frac{2}{3}\ln|3x+5|\right]_1^2$

$\frac{2}{3}\ln 11 - \frac{2}{3}\ln 8$

$\frac{2}{3}\ln 11 - \ln 4$ units^2

5/ $\int_0^1 10(2x+1)^{-3}\,dx$

$\left[-5(2x+1)^{-2}\cdot\frac{1}{2}\right]_0^1$

$\left[-\frac{5}{2}(2x+1)^{-2}\right]_0^1$

$\left[-\frac{5}{2}(3)^{-2}\right] - \left[-\frac{5}{2}(1)^{-2}\right]$

$= \frac{20}{9}$ units^2

6a) $$\frac{3x}{(x+1)(x-2)} = \frac{A}{x+1} + \frac{B}{x-2}$$

$$3x = A(x-2) + B(x+1)$$

Let $x = 2$ $\quad 6 = 3B$

$B = 2$

Let $x = -1$ $\quad -3 = -3A$

$A = 1$

$$\frac{1}{x+1} + \frac{2}{x+2}$$

b) $$\int \frac{1}{x+1} + \frac{2}{x+2}\, dx$$

$$\ln|x+1| + 2\ln|x+2| + C$$

7/ $$\frac{2x^2+3x+7}{(x+1)^2(x+3)} = \frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{x+3}$$

$$2x^2+3x+7 = A(x+1)(x+3) + B(x+3) + C(x+1)^2$$

Let $x=-1$

$$6 = 2B$$

$$B = 3$$

Let $x=-3$

$$16 = 4C$$

$$C = 4$$

Let $x=0$

$$7 = 3A + 3B + C$$

$$7 = 3A + 9 + 4$$

$$-6 = 3A$$

$$A = -2$$

$$\int_0^5 \frac{3}{(x+1)^2} + \frac{4}{x+3} - \frac{2}{x+1}\, dx$$

$$\int_0^5 3(x+1)^{-2} + \frac{4}{x+3} - \frac{2}{x+1}\, dx$$

$$\left[-3(x+1)^{-1} + 4\ln|x+3| - 2\ln|x+1| \right]_0^5$$

$$\left[-\frac{1}{2} + 4\ln 8 - 2\ln 6 \right] - \left[-3 + 4\ln 3 - 2\ln 1 \right]$$

$$\frac{5}{2} + 4\ln 8 - 2\ln 6 - 4\ln 3$$

$$\underline{\frac{5}{2} + 12\ln 2 - 2\ln 6 - 4\ln 3}$$