Solutions :

1. a) $\ln|x-3| - \ln|x-2| + C$

b) $2\ln|x-1| - \ln|x-2| + C$

c) $\frac{x^2}{2} - 4x + 18\ln|x+3| - 4\ln|x+2| + C$

d) $\ln|x| + 2\ln|x-2| - 2\ln|x+2| + C$

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

f) $-\frac{1}{4}\ln|x-1| - \frac{1}{2}\frac{1}{x-1} + \frac{1}{4}\ln|x+1| + C$

g) $-\ln|x| + \ln(x^2+4) - \frac{1}{2}\tan^{-1}\frac{x}{2} + C$

h) $\frac{1}{2}\ln(x^2+4) + \frac{12}{x^2+4} + \frac{1}{2}\frac{x}{x^2+4} + \frac{1}{4}\tan^{-1}\frac{x}{2} + C$

2. a) $2\sqrt{x} - 2\ln|1+\sqrt{x}| + C$

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

c) $\frac{1}{3}x^{\frac{3}{4}} - \frac{1}{3}\ln|1+x^{\frac{3}{4}}| + C$

d) $\frac{2}{3}(1+e^x)^{\frac{3}{2}} - 2(1+e^x)^{\frac{1}{2}} + C$

3. Midpoint Rule : 1.1552
Trapezoidal Rule : 1.1533
Simpson ' s Rule : 1.1614

4. a) Trapezoidal Rule : 1.2821
Simpson ' s Rule : 1.2953

b) Error for Trapezoidal Rule : .042
Error for Simpson ' s Rule : .004

5. a) Diverges

b) $\frac{1}{\ln 2}$

c) 0

d) π

e) 3

f) Diverges