SOLUTION #9 (9 AM)

Solution 1. (1) $\displaystyle\int (e^{2x} - \frac{1}{x^2})\,dx = \int e^{2x}dx - \int \frac{1}{x^2}dx$

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

(2) $\displaystyle\int (x^3 - \frac{1}{x})dx = \int x^3dx - \int \frac{1}{x} = \frac{x^4}{4} - \ln|x| + C$

(3) *let* $u = \ln x$, *then* $du = \frac{1}{x}dx$.

$$\int \frac{1}{x\ln x}dx = \int \frac{1}{\ln x}\cdot\frac{1}{x}dx = \int \frac{1}{u}du = \ln|u| + C = \ln|\ln x| + C$$

(4) *let* $u = t^2 + 1$, *then* $du = 2tdt$.

$$\int t\sqrt{t^2+1}dt = \int \frac{\sqrt{t^2+1}}{2}\cdot 2tdt = \int \frac{\sqrt{u}}{2}du = \frac{1}{2}\int u^{\frac{1}{2}}du$$

$= \frac{1}{2}\cdot\frac{u^{\frac{1}{2}+1}}{\frac{1}{2}+1} + C = \frac{(t^2+1)^{\frac{3}{2}}}{3} + C$