

Q2) b) $f(x) = \frac{4}{x(1+4\ln x)^2} dx$

$$u = 4\ln x + 1 \quad \frac{du}{dx} = \frac{4}{x}$$

$$\frac{dx}{x} = \frac{1}{4} du$$

$$\int \frac{1}{u^2} du$$

$$= -\frac{1}{u}$$

$$= -\frac{1}{4(\ln(x)+1)} + C$$

c) $\int_{\ln 2}^{\ln 5} \frac{3e^{2x}}{\sqrt{e^x - 1}} dx$

$$u = e^x - 1 \quad \frac{du}{dx} = e^x$$

$$dx = e^{-x} du$$

$$e^{2x} = (u+1)^2$$

$$\int \frac{u+1}{\sqrt{u}} du$$

$$= \int \sqrt{u} du + \int \frac{1}{\sqrt{u}} du$$

$$\left[2\sqrt{e^x - 1} (e^x + 2) \right]_{\ln 2}^{\ln 5}$$

$$= 20$$