P.I.

$$\frac{1}{(D'+1)^2}\cdot\frac{1}{(1-e^z)^2} = \frac{1}{(D'+1)}\cdot\left\{\frac{1}{(D'+1)}\cdot\frac{1}{(1-e^z)^2}\right\}$$

$$= \frac{1}{(D'+1)}\left\{\frac{1}{(D'+1)}\cdot Q(z)\right\}$$ where $Q(z)=\frac{1}{(1-e^z)^2}$

$$= \frac{1}{(D'+1)}\left[e^{-z}\int e^z\cdot Q(z)\,dz\right]$$

$$= \frac{1}{(D'+1)}\left[e^{-z}\int e^z\cdot\frac{1}{(1-e^z)^2}\,dz\right]$$

put $1-e^z = t$

$e^z\,dz = -dt$

$$\frac{1}{(D'+1)}\left[e^{-z}\int -\frac{dt}{t^2}\right]$$

$$= \frac{1}{(D'+1)}\left[e^{-z}\left(\frac{1}{t}\right)\right]$$

$$= \frac{1}{(D'+1)}\left(\frac{e^{-z}}{1-e^{z}}\right) = \frac{1}{(D'+1)}\left(Q'(z)\right)$$ where $Q'(z) = \frac{e^{-z}}{1-e^{z}}$

$$= e^{-z}\int e^{z}\cdot Q'(z)\,dz$$

$$= e^{-z}\int e^{z}\frac{e^{-z}}{1-e^{z}}\,dz$$

$$= e^{-z}\int \frac{1}{1-e^{z}}\,dz$$

$$= e^{-z}\int\left(1-\frac{e^{z}}{1-e^{z}}\right)dz$$

$$= e^{-z}\left(z - \log(e^{z}-1)\right)$$ $\because z = \log x$

$$= e^{-\log x}\left[\log x - \log(e^{\log x}-1)\right]$$

$$= \frac{1}{x}\left[\log x - \log(x-1)\right]$$ A