Calculus II - 2

Names: $\boxed{\text{Sols}}$

Evaluate the integrals using the substitution method. Show your work.

$\int \sqrt[3]{5x-1}\, dx$; $u = 5x-1$ $du = 5 \cdot dx$

$$\int \sqrt[3]{5x-1}\, dx = \frac{1}{5}\int u^{1/3}\, du = \frac{3}{20} u^{\frac{4}{3}} + C = \boxed{\frac{3}{20}\sqrt[3]{(5x-1)^4} + C}$$

$\int \frac{dx}{3x+1}$; $u = 3x+1$ $du = 3dx$

$$\int \frac{dx}{3x+1} = \frac{1}{3}\int \frac{du}{u} = \frac{1}{3}\ln|u| + C = \boxed{\frac{1}{3}\ln|3x+1| + C}$$

$\int (1+e^t)^4 e^t\, dt$; $u = 1+e^t$ $du = e^t dt$

$$\int (1+e^t)^4 e^t\, dt = \int u^4\, du = \frac{1}{5}u^5 + C = \boxed{\frac{1}{5}(1+e^t)^5 + C}$$

$\int \frac{\sin(t)}{1+\cos(t)}\, dt$; $u = 1+\cos(t)$ $du = -\sin(t)\, dt$

$$\int \frac{\sin t}{1+\cos t}\, dt = -\int \frac{du}{u} = -\ln|u| + C = \boxed{-\ln|1+\cos t| + C}$$

$\int_e^{e^4} \frac{dy}{y\sqrt{\ln(y)}}$; $u = \sqrt{\ln(y)}$ $du = \frac{1}{2y\sqrt{\ln(y)}}\, dy$.

$$\int_e^{e^4} \frac{dy}{y\sqrt{\ln(y)}} = \int_1^2 2\, du = \left[2u\right]_1^2 = 4-2 = \boxed{2}$$