

1. Compute each integral:

(a) 
$$\int_e^{e^2} \frac{1}{t(\ln t)^2} dt$$

(b) 
$$\int_0^{\ln(\sqrt{3})} \frac{e^x}{1+e^{2x}} dx$$

(c) 
$$\int_{-1}^4 x\sqrt{5+x} dx$$

(d) 
$$\int_1^2 \frac{1}{\sqrt{x}\sqrt{4-x}} dx$$

2. (a) Show that  $\frac{d}{dx} \left( \int_a^{g(x)} f(t) dt \right) = f(g(x))g'(x)$

(b) Compute  $\frac{d}{dx} \left( \int_a^{x^2} \frac{\sin t}{t} dt \right)$