

1. What is  $\int \tan t \sec t dt$ ? Suppose you had forgotten that  $\tan t \sec t = (\sec t)'$ , but you remembered the antiderivatives of the sine and cosine (you do, don't you?). Can you find the solve the problem using substitution?
2. Compute the following integrals. In each case, think about whether substitution will be the best approach before you start.

(a)  $\int \frac{e^{2x} + e^x}{e^x} dx$

(b)  $\int x(x+1)^2 dx$

(c)  $\int \cos x \sqrt{\sin x} dx$

(d)  $\int \frac{x}{x^2 - 1} dx$

3. Find the following integrals:

(a)  $\int_0^{\pi/4} \sec x \tan^2 x dx$

(b)  $\int_1^e \frac{1}{x\sqrt{\ln x}} dx$

(c)  $\int_0^{\pi} \frac{\sin x}{\cos^2 x} dx$

4. Find formulas for the values of these definite integrals, where  $a, b, c, d$  are constants. Do any restrictions apply?

(a)  $\int_a^b (cx + d)^n dx$

(b)  $\int_a^b x(cx^2 + d)^n dx$

5. If  $\int_a^b f(x) dx = b^3 - a^3$  for all numbers  $a$  and  $b$ , what is  $\int_a^b f'(x) dx$ ? (Hint: Use the FTC)