

MATH 134 – Calculus with Fundamentals 2  
Another Practice Day on  $u$ -substitution  
February 12, 2018

*Background*

Today, we want to continue working on  $u$ -substitutions involving other transcendental functions.

*Questions*

For each problem,

- (i) find a candidate  $u$ ,
- (ii) compute  $du = \frac{du}{dx} dx$
- (iii) see whether the rest of the integrand can be matched with  $du$ , possibly up to a constant multiple (if not, then you might need to try a different  $u$ ),
- (iv) finish the integration.

1.  $\int_1^{\sqrt{3}} \frac{dx}{\tan^{-1}(x)(1+x^2)} dx$

2.  $\int_e^{e^2} \frac{dx}{x(\ln(x))^4} dx$

3.  $\int \frac{\ln(\ln(x))}{x \ln(x)} dx$  (Note: There are several possible  $u$  to try here; keep going until you find the right one!)

4.  $\int e^t \sqrt{e^t - 1} dt$

5.  $\int 8^x dx$  (Hint: rewrite  $8^x$  as  $8^x = (e^{\ln(8)})^x = e^{x \ln(8)}$ , then think how you would do this by a  $u$ -substitution. The same trick will work to integrate any  $\int b^x dx$  where  $b > 0$ . See page 315 in Rogawski and Adams.)