

MATH 136 – Calculus 2  
Second Practice Day on  $u$ -substitution  
February 5, 2020

*Background*

Here are a few additional integration formulas that can be used in conjunction with  $u$ -substitution:

- If  $b > 0$ , then  $\int b^x dx = \frac{b^x}{\ln(b)} + C$  (This follows by combining the derivative rule for  $e^u$  by the chain rule with the formula  $b^x = (e^{\ln(b)})^x = e^{x \ln(b)}$ .)
- $\int \frac{dx}{|x|\sqrt{x^2 - 1}} = \sec^{-1}(x) + C$  (follows from the derivative rule

$$\frac{d}{dx} \sec^{-1}(x) = \frac{1}{|x|\sqrt{x^2 - 1}}$$

*Questions*

Find the following integrals using the formulas above and  $u$ -substitution as needed:

1.  $\int 5^{\cos(x)} \sin(x) dx$
2.  $\int \frac{dx}{(x+8)\ln(2x+16)}$
3.  $\int \frac{dx}{x\sqrt{49x^2-1}}$  – take ( $x > 0$ )
4.  $\int x^2\sqrt{x+4} dx$  (Hint: Let  $u = x + 4$ )
5.  $\int_0^1 4^{3x} dx$