Math 30 – Workshop #15

1. Consider the function $f(x) = x^x$.

   (a) How is this function different from the functions a^x and x^a, where a is some constant?

   (b) Without doing any computations what do you think the derivative of $f(x) = x^x$ is?

   (c) Compute $f'(x)$.

   (d) Looking back at your guess in part (b), were you surprised by the final answer?

2. Compute the derivative of $f(x) = x^{\sin x}$.

3. Compute the derivative of $f(x) = (\sin x)^x$.

4. Consider the function $f(x) = \dfrac{5}{(1 + \tan x)^3}$.

   (a) Compute the derivative using the quotient rule.

   (b) Rewrite the function so that you can compute the derivative without using the quotient rule.

   (c) Which method do you prefer? Why?

5. Consider the function $f(x) = \dfrac{\tan^2 x}{\sec x \sin x}$.

   (a) Compute the derivative using the quotient rule.

   (b) Simplify the function using your knowledge of trigonometry before computing the derivative.

   (c) Which method do you prefer? Why?