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MATH 140 : CALCULUS II

Problem Set 8 – due Monday, March 2nd

INSTRUCTIONS:
Please submit this at the *start* of Monday's class. Don't worry if you don't manage the get an answer for any particular question, but please give each problem an honest try (and record what you were able to accomplish, even if you didn't solve it). Eventually you should make sure to understand the problems, as some of them may appear on next week's in-class quiz. You are encouraged to collaborate with other students on these problems. However, please write up your solutions in isolation from one another.

8.1 In which, we explore derivatives of tangent and related functions.

(a) Show that $\frac{d}{dx}\tan x = \frac{1}{\cos^2 x}$. [*Recall that* $\tan x = \frac{\sin x}{\cos x}$*; we know the derivatives of both* sin *and* cos.]

(b) Show that $\frac{d}{dx}\tan^{-1} x = \cos^2(\tan^{-1} x)$.

(c) By drawing an appropriate right triangle, deduce from above that $\frac{d}{dx}\tan^{-1} x = \frac{1}{x^2+1}$.

8.2 Evaluate $\frac{d}{dx}x^x$. [*Hint: Don't use formulas blindly! Think about how we differentiated* 2^x *in class, and try to adapt that process.*]

8.3 Textbook, Chapter 3 Miscellaneous problems (pages 219-220) # 1, 3, 5, 18, 20, 36, 41