

# Discussion Problems for Math 180

Tuesday, April 7, 2015

*Review – take no more than five minutes per question.*

1. What is  $1 + 2 + 3 + 4 + \cdots + 2000$ ?
2. Where is the function  $f(x) = \arctan(x)$  concave up? ... concave down?
3. Explain why the derivative of  $4^x$  is  $4^x \ln(4)$ . You may use that  $\frac{d}{dx} e^x = e^x$  and  $\frac{d}{dx} \ln(x) = \frac{1}{x}$ .

*This time*

4. Find antiderivatives of the following functions:
  - (a)  $2x - 3$
  - (b)  $\sin(x)$
  - (c)  $\frac{1}{1 + x^2}$
  - (d)  $\frac{4}{3x}$
  - (e)  $\frac{6}{x^2}$
5. Determine the antiderivative of  $\frac{1}{2x^2 + 3}$ . (This will take some creativity, but compare 4(c).)
6. Calculate a left Riemann sum for the function  $x^2 - 3x + 1$  on the interval  $[1, 5]$  with four rectangles.
7.
  - (a) Calculate a left Riemann sum for the function  $2x - 3$  on the interval  $[0, 1]$  with 4 rectangles.
  - (b) Write down an expression for the left Riemann sum of this function on this interval with  $n$  rectangles.
  - (c) Plug in  $n = 4$  into your answer from part (b) and check that you get the same answer as you got for part (a).
  - (d) Simplify your expression from part (b). (Hint: Problem 1.)
  - (e) Take the limit of your answer from part (d) as  $n \rightarrow \infty$ .