Discussion Problems for Math 180

Thursday, March 19, 2015

Review

1. Explain why the following are true.
   
i. \((ab)^c = a^{bc}\)
   
   ii. \(a^b \cdot a^c = a^{b+c}\)
   
   iii. \(\log(ab) = \log(a) + \log(b)\)
   
   iv. \(\log(a^n) = n \log(a)\)

2. True or false?
   
i. \(\log(a + b) = \log(a) + \log(b)\)
   
   ii. \((a + b)^2 = a^2 + b^2\)
   
   iii. \(\sin(x + y) = \sin(x) + \sin(y)\)
   
   iv. \(\sqrt{1 + x} = 1 + \sqrt{x}\)

This time

3. Write a linear approximation to the function \(f(x) = \sin^2(x) + 1\) near \(x = \frac{2\pi}{3}\).

4. Write a linear approximation to the function \(f(x) = 2xe^{x-1}\) near \(x = 1\).

5. Find approximations of the following numbers by hand by using linear approximations of appropriate functions.
   
i. \(\sin(0.004)\)
   
   ii. \(\sqrt[3]{7.97}\)
   
   iii. \((1.01)^{12}\)
   
   iv. \(\cos(46^\circ)\)

6. [Briggs and Cochran, 4.4.28] A marble is placed into a (cylindrical) pot which is eight inches across. The pot is then filled with water until the marble is just covered. What radius of marble requires the most water to cover?