Discussion Problems for Math 180

Thursday, March 19, 2015

Review

1. Explain why the following are true.

   i. $(a^b)^c = a^{bc}$

   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 $x = \dfrac{2\pi}{3}$.

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?