

Discussion Problems for Math 180

Tuesday, November 4, 2014

For problems 1 - 5, estimate each value without using a calculator by using a linear approximation to some function. Specify the function you're using and the point at which you're linearizing. Indicate whether your estimate is an over- or an under-estimate.

1. $\sin(0.0038)$

2. $\sqrt{80}$

3. $\frac{1}{1.03}$

4. $\ln(1.0087)$

5. 1.0001^{45}

6. $4 \tan^{-1}(1.067) - \pi$

Solve the following problems.

6. (a) Use a local linear approximation of $\ln(x)$ at $x = e$ to estimate $\ln(2)$. Leave your answer exact.
(b) Using the result from part (a), obtain an approximation of $\log_2(31)$. Leave your answer exact.
7. (a) What is the volume, V , of a sphere with radius r ?
(b) How many cubic centimeters are there in a milliliter?
(c) High atop university hall, your TA inflates a water balloon from a hose which pumps out water at a rate of 628 mL/s. Assuming that the water balloon remains perfectly spherical while inflating, how fast is the diameter of the balloon expanding when the balloon is 10 cm across? Use the approximation $\pi \approx 3.14$ to get an approximate answer.