Math 2, Homework 1

Complete each of the problems below. Remember to show all of your work.

Trigonometry

1. Graph:
   a. $f(x) = 3\sin(\frac{x}{2})$
   b. $f'(x)$

2. Compute:
   a. $\sin(\frac{\pi}{3})$
   b. $\arccos(1)$
   c. $\arccos(\sin(\frac{\pi}{3}))$

3. Prove that $\sec^2(x) - \tan^2(x) = 1$. For what values of x is this valid?

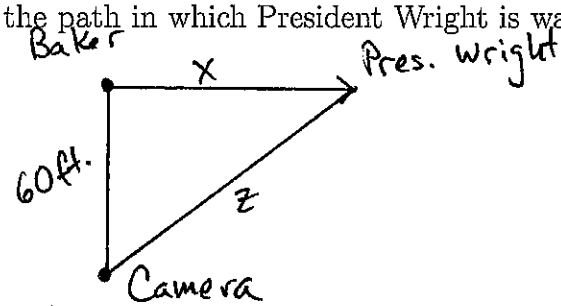
Differentiation

4. a. $f(x) = x^3 + \ln(x)$. $f'(x) = ?$
   b. $g(x) = x^3 \ln(x)$. $g'(x) = ?$
   c. $h(x) = \frac{x^3}{\ln(x)}$. $h'(x) = ?$
   d. $k(x) = (\ln(x))^3$. $k'(x) = ?$

5. a. $f(x) = \sin(e^x)$. $f'(x) = ?$
   b. $g(x) = \sin(e^{2x})$. $g'(x) = ?$

Related Rates

6. President Wright is filming a commercial for Dartmouth. In one scene, he is walking away from the Baker clock tower at a speed of 3 feet per second. The camera filming him is 60 feet from the tower, at a right angle to the path in which President Wright is walking (see picture below).



a. Express the distance (z) between President Wright and the camera as a function of x.

b. How fast is the distance from President Wright and the camera changing when he is 30 feet from the clock tower?