KEY

Math 125-Quiz 17[1]
October 24, 2011

You have ten minutes to complete this quiz.

1. Determine $f'(x)$ for each function.

   (a) $f(x) = (x^3 - 2x + 1)^2$

   $f'(x) = 2(x^3 - 2x + 1)(3x^2 - 2)$

   (b) $f(x) = x^2 \sin(2x)$

   $f'(x) = x^2 \cos(2x) \cdot 2 + 2x \sin 2x$

   (c) $f(x) = e^{\cos(x)}$

   $f'(x) = -\sin x \, e^{\cos x}$

2. A trig identity gives $\sin^2(x) = \frac{1-\cos(2x)}{2}$. Differentiate both sides to get another known trig identity.

   $\sin^2 x = \frac{1-\cos 2x}{2} = \frac{1}{2}(1-\cos 2x)$

   $2\sin x \cos x = \frac{1}{2}(\sin 2x \cdot 2) = \sin 2x$

3. A spherical balloon is being inflated. If the volume of the balloon is given by $V = \frac{4}{3}\pi r^3$ and the radius is increasing at 5 inches per minute, how fast is the volume increasing (when the radius is 10 inches).

   $V = \frac{4}{3}\pi r^3$

   $\frac{dV}{dt} = \frac{dV}{dr}\frac{dr}{dt}$ $\quad \frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$

   $= 4\pi(10)^2(5) = 2000\pi \text{ in}^3/\text{min}$

[1]You are excused to leave when you're finished with this quiz.