

18.01, September 19, 2003 Trig. Fnooms

1J-1, 1J-2, 1J-3, 1J-4

1. Quick review of trig: deferential of sin, cos, tan in terms of sides of n right  $\Delta$ , angle addition, angle doubling,  $\sin^2 + \cos^2 = 1$ ,  $\sec(\theta)$ ,  $\csc(\theta)$ ,  $\cot(\theta)$ , and graphs.

2.  $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$  graphically (b, comparing arc length of a small arc to chord length)

3. Derived from 2 that  $\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{\theta} = 0$ ,  $\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{\theta^2} = \frac{1}{2}$

4. Derivative of  $\sin(x)$ ,  $\cos(x)$  by deferential derivative of  $\tan(x)$  by qtt rule (did some of  $\frac{d}{dx} \sec(x)$ ,  $\frac{d}{dx} \csc(x)$ ,  $\frac{d}{dx} \cot(x)$ ).

5. Compute max's and min's of  $\sin(x)$  and  $\cos(x)$  and pointed this out on the graph.

6. Pointed out that for  $v = \tan(x)$ ,  $\frac{dv}{dx} = 1 + v^2$  (will be useful later)

7. Computed derivatives of  $x \sin(\frac{1}{x})$  and  $x^2 \sin(\frac{1}{x})$ .

Reason:  $x^2 \sin(\frac{1}{x})$  has derivative at every pt., but not cts. Diff.