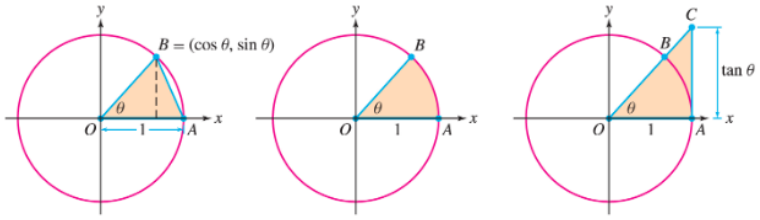
1. (a) Suppose $0 < \theta < \frac{\pi}{2}$. Recall the formulas for the area of a triangle and a sector (pie slice) of a circle. Find the area of each shaded region below. Explain why the height of the triangle on the right is $\tan(\theta)$.



(b) Order the areas you computed in part (a) from smallest to largest. Use this to argue that $\cos(\theta) \leq \frac{\sin(\theta)}{\theta} \leq 1$ for $0 < \theta < \frac{\pi}{2}$. [Actually, it is true for $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$.]

(c) Use the Squeeze Theorem to argue that $\lim_{x \to 0} \dfrac{\sin(\theta)}{\theta} = 1$. State specifically what $l(x)$, $f(x)$, $u(x)$, c and L are.

(d) Consider the graph of $\sin(\theta)$. What is the slope of the secant line between the points $(0, 0)$ and $(\theta, \sin(\theta))$? What is the slope of the tangent line through $(0, 0)$?

(e) Consider the graph of $\cos(\theta)$. What do you think the slope of the tangent line through $(0, 1)$ is? How does this relate to the fact that $\lim_{x \to 0} \dfrac{1 - \cos(\theta)}{\theta} = 0$?