Math 1300-018 Quiz 9 Name:_____

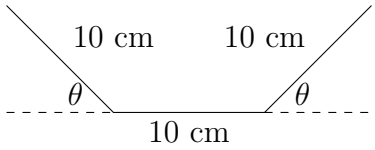
1. Find the following limits if they exist. MAKE SURE L'HOSPITAL'S RULE APPLIES BEFORE USING IT.

   (a)
   $$\lim_{x\to\infty} x^{1/x}, \quad \lim_{x\to 0^+} x^{1/x}$$

   (b)
   $$\lim_{x\to\infty} x\tan(1/x), \quad \lim_{x\to 2/\pi^+} x\tan(1/x)$$

   (c)
   $$\lim_{x\to 0^+} (\sin x)^{\sin x}, \quad \lim_{x\to \pi/2} \sin x^{\sin x}$$

2. A long sheet of metal of width 30 cm will be bent into a gutter as shown. Find θ such that the gutter will have maximum capacity.



3. (Bonus) Find the minimum length of the line segment from the y-axis to the x-axis going through the point (a, b) in the first quadrant $(a, b > 0)$. [Answer: $(a^{2/3} + b^{2/3})^{3/2}$.]