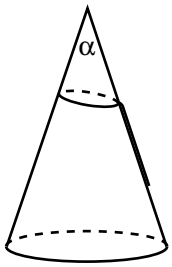
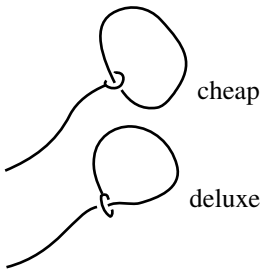
Week 7 (10/28/02)

Mountain climber

A mountain climber wishes to climb up a frictionless conical mountain. He wants to do this by throwing a lasso (a rope with a loop) over the top and climbing up along the rope. Assume that the mountain climber is of negligible height, so that the rope lies along the mountain, as shown.



At the bottom of the mountain are two stores. One sells "cheap" lassos (made of a segment of rope tied to loop of rope of *fixed* length). The other sells "deluxe" lassos (made of one piece of rope with a loop of *variable* length; the loop's length may change without any friction of the rope with itself).



When viewed from the side, this conical mountain has an angle α at its peak. For what angles α can the climber climb up along the mountain if he uses:

(a) a "cheap" lasso?

(b) a "deluxe" lasso?