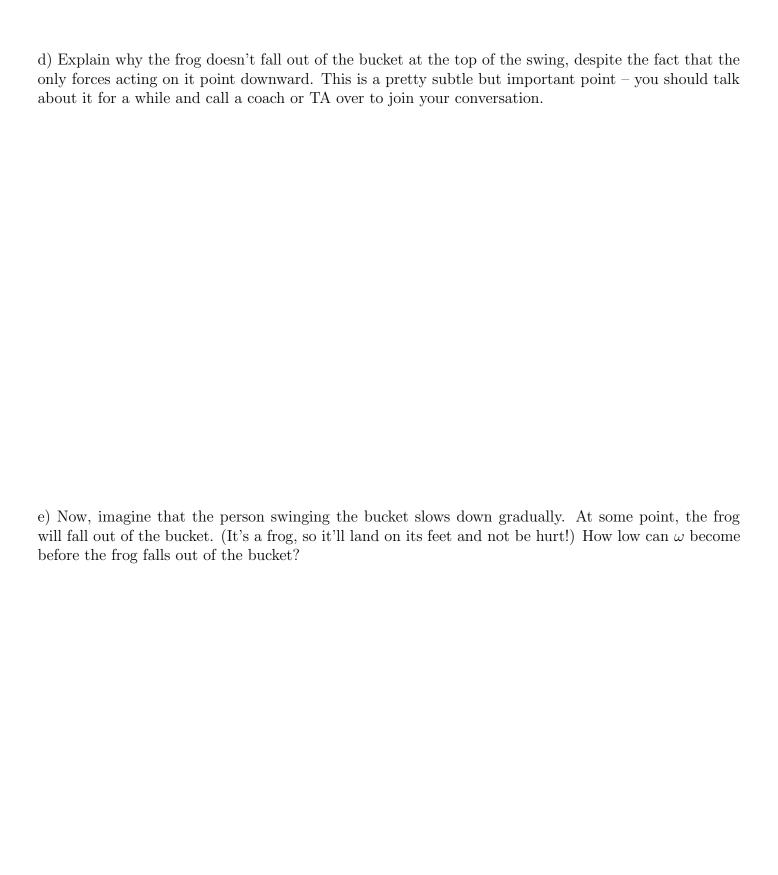
RECITATION EXERCISES $_{12~\mathrm{March}}$

A person uses a rope to spin a bucket in a vertical circle at a constant speed; the radius of the circle is 80 cm. The bucket goes around the circle once every second. Inside the bucket is a friendly frog of mass 500 grams.

a) Draw a force diagram for the frog when the bucket is at the top of the circle, and when bottom.	it is at the
b) What is the acceleration of the bucket? (Think about both its magnitude and direction.)	
c) As you saw last week in your homework, your "apparent weight" is simply the magni- normal force that an object under you exerts on you. What is the frog's apparent weight at and at the top of the circle?	



A highway curve has a radius of curvature of 500 meters; that is, it is a segment of a circle whose radius is 500 m. It is banked so that traffic moving at 30 m/s can travel around the curve without needing any help from friction.
a) Draw a force diagram for a car traveling around this curve at a constant speed. Draw the diagram so that you are looking at the rear of the car. <i>Hint:</i> Do not tilt your coordinate axes for this problem!
b) What is the acceleration of the car in the x direction? What about the x direction?
b) What is the acceleration of the car in the x -direction? What about the y -direction?
c) Write down two copies of Newton's second law in the $x-$ and $y-$ directions.
d) Solve the resulting system of two equations to determine the banking angle of the curve.