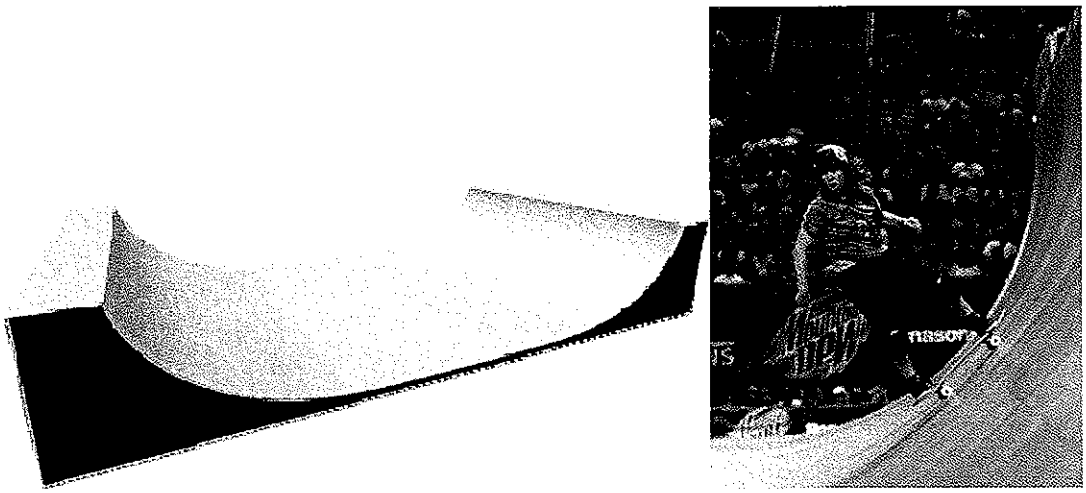
2008-2009 EE Ph.D. Qualifying Exam
Question area: *Engineering Physics*
Examiner: *Jelena Vuckovic*

Please give order of magnitude answers to all of the questions below, and make any approximations you believe are reasonable.

1. [7 pts]
   Skateboarding or snowboarding on a half-pipe (ramp), as shown in the figures below is a very popular sport (half-pipe snowboarding is now even a Winter Olympics sport).
   Suppose the half-pipe is 10m high and 20m wide, and the skateboarder's weight is 70kg (the skateboarder releases him/herself from the top of the half-pipe).
   a) What is the maximum velocity that the skateboarder has at any point of the half-pipe?
   b) What is the approximate skateboarder's oscillation period?
   c) Under your assumptions, how would your answers to (a) and (b) change if the skateboarder is lighter or heavier?



(Figures from Wikipedia)

2. [3pts]
   What area of Nevada would you have to cover with solar cells in order to provide all energy needed for the US?
   The solar flux is 340 Wm^{-2} at the surface of the Earth, and the current energy consumption in the US is 3.35TW. State all your assumptions.