

UNIVERSITY OF ALABAMA
Department of Physics and Astronomy

PH 125 / LeClair

February 13, 2009

Quiz 7

Instructions:

1. Answer all three questions below. Both have equal weight.
2. Express your answer with the appropriate units and significant digits
3. Show your work for full credit.

1. A particle of mass $m = 2$ kg experiences a spatially varying potential energy $U(x) = \frac{-2}{x} + \frac{1}{x^2}$, where x is in meters and U is in Joules. In other words, $U(x)$ is the sum total potential energy of the particle (from all sources) for any position x . What is the *stable* equilibrium position of the particle? Recall that $F = -\frac{dU}{dx}$.

2. An object of mass m is attached to a spring hung vertically from the ceiling. After attaching the mass m , the spring stretches a distance d from its former equilibrium. If $m = 0.55$ kg and $d = 2$ cm, what is the force constant of the spring?

3. Consider the potential energy versus position diagram $U(x)$ below. An particle of mass 0.1 kg subjected to this potential energy function has a *total* energy of 1 J. What is (roughly) its maximum possible displacement? You may assume perfect conservation of potential + kinetic energy.

