Classical Mechanics 2017: Diagnostic Test

Name: _____

1. A package is released from a plane flying at a height.
(a) Qualitatively sketch the trajectory of the stone (no need to calculate).
(b) Draw the forces acting on the package, at some point during its descent.

2. Draw all the external forces acting on the following objects
(only show directions, no need to calculate):
(a) a stationary ladder reclining against a wall
(b) a wheel rolling without slipping on a flat plane
(c) A fly sitting on a rotating LP record

3. A block B of mass *m* is sliding from rest down a
 frictionless inclined plane which makes an angle β with the horizontal plane. The
 inclined plane is attached to the top of a car. When the car starts from rest with an
 acceleration *a,* the sliding slows down.
(a) Which direction is the inclined plane facing ?
(b) Draw forces acting on the block B, and write down its equations of motion, when
the car is accelerating.

4. The shape of a cricket bat is completely known. How many more independent
numbers are needed to describe its position (at a fixed time t) completely ?