ASTR 340 - Origin of the Universe
HOMEWORK #2 (Tuesday Feb 17 2015)
due date: Thursday Feb 23 in class

FMC=Foundations of Modern Cosmology – the textbook

1. The laws of Newtonian dynamics [20 pts.]
A. Briefly explain why Newton's laws of motion and gravity are more
fundamental than Kepler's laws of planetary motion 5 pts

B. What are inertial and accelerated frames of reference? 5 pts

C. After watching many Road Runner cartoons you decide to try out one of
Wile E. Coyote's most promising schemes. You attach a fan and a sail to yourself
while wearing roller skates, hoping to move really fast in the forward direction.
Surprisingly, although the sail catches well the wind from the fan, you stand
perfectly still no matter how fast you make the fan blow. Why? 10pts

2. Conservation of momentum and Newton's Law of Gravity [20 pts.]
FMC, Q3.4 (pg 81 in the book) – it has two parts 10 pts each.

3. Forces and accelerations [20 pts.]
A. What is a Galilean transformation? 5 pts

B. What is Galilean invariance? 5 pts

C. What is a fictitious force? Give an example. 10 pts

4. Principles of Cosmology and Galilean transforms [30 pts.]
A. Explain, in your own words, the "Cosmological Principle". 5 pts

B. FMC 6.8 (pg 180) 15 pts

C. What do "homogeneous" and "isotropic" mean? Give an example of a system
that is isotropic. but not homogeneous and one that is homogeneous but not
isotropic. 10pts