Cornell
TAM/ENGRD 2030

Prelim 1

March 1, 2011

No calculators, books or notes allowed.

3 Problems, 90 minutes (+ up to 90 minutes overtime)

How to get the highest score?

Please, please, please do these things:

- ⌁• Draw **Free body diagrams** whenever force, moment, linear momentum, or angular momentum balance are used.

- →• Use correct **vector notation**.

- A+ Be   (I) neat,   (II) clear and   (III) well organized.

- ☐ TIDILY REDUCE and box in your answers (Don't leave simplifiable algebraic expressions).

- >> Make appropriate Matlab code clear and correct.
  You can use shortcut notation like "$T_7 = 18$" instead of, say, "T(7) = 18".
  Small syntax errors will have small penalties.

- ↑→ Clearly **define** any needed dimensions $(\ell, h, d, \dots)$, coordinates $(x, y, r, \theta \dots)$, variables $(v, m, t, \dots)$, base vectors $(\hat{\imath}, \hat{\jmath}, \hat{e}_r, \hat{e}_\theta, \hat{\lambda}, \hat{n} \dots)$ and signs $(\pm)$ with sketches, equations or words.

- ⇥ **Justify** your results so a grader can distinguish an informed answer from a guess.

- ⟳ If a problem seems *poorly defined*, clearly state any reasonable assumptions (that do not oversimplify the problem).

- ≈ Work for **partial credit** (from 60–100%, depending on the problem)

  - Put your answer is in terms of well defined variables even if you have not substituted in the numerical values.

  - Reduce the problem to a clearly defined set of equations to solve.

  - Provide Matlab code which would generate the desired answer (and explain the nature of the output).

- ▱ **Extra sheets.** Put your name on each extra sheet, fold it in, and refer to it at the relevant problem.
  Note the last page is **blank** for your use. Ask for more extra paper if you need it.

Problem 1: _____ /25

Problem 2: _____ /25

Problem 3: _____ /25

1)

2)

3)