APPM 1350 EXAM 2 FALL 2006

INSTRUCTIONS: Books, notes, flying monkeys and electronic devices are not permitted. Write your (1) name, (2) instructor's name, and (3) recitation section on the front of your bluebook. Also make a scoring table, with places for 5 problems, plus a total score. This exam has 5 problems, on both sides of this sheet. Work all **5 problems**. Start each problem on a **new page**. Show you work. Box in your answers. A correct answer with incorrect or no supporting work may receive no credit, while an incorrect answer with relevant work may receive parital credit.

1. (20 points) Evaluate the following:

(a) $\lim_{x \to 0} \dfrac{x^2 - 3x + \sin(x)}{4x}$

(b) $\lim_{x \to \infty} \dfrac{x^2 - 3x + \sin(x)}{4x^2 + 1}$

(c) $\dfrac{dr}{d\theta}$, where $r(\theta)$ is defined implicitly by: $\cos(r) + \cos(\theta) = r\theta$.

2. (20 points) A girl flies a kite at a constant height of 300 ft, the wind carrying the kite horizontally away from her at a rate of 25 ft/sec. How fast must she let out the string when the kite is 500 feet away from her?

3. (15 points) Define $h(\theta) = \sqrt[3]{1 + \cos(2\theta)} = [1 + \cos(2\theta)]^{\frac{1}{3}}$.

(a) Compute the standard linearization, $L(\theta)$, of $h(\theta)$ about $\theta = \dfrac{\pi}{4}$.

(b) Use $L(\theta)$ to approximate $h(0.3\pi)$.

4. (25 points) Define $f(x) = x + \dfrac{1}{x+1}$, for $x \neq -1$.

(a) Identify the coordinates of all local maxima and minima. Say which is which, and justify your answers.

(b) Determine any horizontal, vertical or oblique asymptotes that $f(x)$ might have.

(c) Use (a) and (b) to graph $y = f(x)$. Include and label any maxima, minima and asymptotes in your graph.

HEY, THERE'S MORE – TURN THE PAGE OVER

5. (20 points) The US Postal Service will accept a box for domestic shipment only if the sum of its length and girth (distance around) does not exceed 108 in. What dimensions will give a box with a square end the largest possible volume?