

APPM 1350 – Exam 2
Wednesday, 12 March 2008 A.D.

INSTRUCTIONS: Books, notes, flying monkeys and electronic devices are not permitted. Write your (1) name, (2) student number, (3) instructor's name (Radulescu or Chang), and (3) when your lecture meets on the front of your bluebook. Also make a scoring table, with places for 6 problems, plus a total score. Work all 6 problems. Start each problem on a new page. Show your 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 partial credit.

1. (15 points)

(a) Calculate: $\lim_{x \rightarrow \infty} \frac{2\sqrt{x} + x^{-1}}{3x - 7}$

(b) Calculate: $\lim_{x \rightarrow -\infty} \frac{1 - x + x^2}{2 + x - 2x^2}$

(c) Calculate: $\lim_{t \rightarrow 0} \frac{2t}{\tan t}$

2. (10 points) Find the points on the curve $x^2 + xy + y^2 = 7$ where the tangent line is parallel to the x -axis.

3. (20 points) Alice and Bob are walking on straight streets that meet at right angles. Alice approaches the intersection at 2 m/sec; Bob moves away from the intersection at 1.5 m/sec. At what rate is the distance between them changing when Alice is 12 m from the intersection and Bob is 9 m from the intersection? Express your answer in meters per second.

4. (20 points) Consider the equation $x = \frac{1}{3 - x^2}$.

(a) Show that the equation has at least one solution in $(0, 1)$.

(b) Approximate this solution by using Newton's method for $x_0 = 0$ (calculate only x_1).

5. (20 points) Consider the function $f(x) = \frac{x^2 + x + 1}{x + 1}$, for $x \neq -1$.

(a) Find the x and y coordinates of all local maxima and minima. Identify which are maxima and which are minima. Justify your answers.

(b) Determine any horizontal or vertical asymptotes the graph of f might have.

(c) Graph f , using the information from (a) and (b). In your graph, show and label all maxima, minima and asymptotes.

6. (20 points)

(a) State the Mean Value Theorem.

(b) A rectangular plot of farmland will be bounded on one side by a river and on the other three sides by a single-strand electric fence. With 800 m of wire at your disposal, what is the largest area you can enclose?