Mathematics 221, Lecture 1 **Name:** _____
Instructor: L. Maxim **TA's Name:** _____

PRACTICE EXAM II

Do all six of the following problems. Show all your work, and write neatly.

No.	Points		Score
1	20		
2	20		
3	20		
4	20		
5	20		
	100	TOTAL POINTS	

Problem I (20 points)
Two ships are steaming straight away from a point O along routes that make a 120° angle. Ship A moves at 14 knots. Ship B moves at 21 knots. How fast are the ships moving apart when $OA = 5$ and $OB = 3$ nautical miles?

Problem II (20 points)
Determine where the curve $y = \frac{x^2-4}{x^2-2}$ is increasing, decreasing, concave up and concave down. Where are its local extrema and inflection points? Use this information to sketch the curve.

Problem III (20 points)
Show that the function

$$f(x) = 2x - \cos^2 x + \sqrt{2}$$

has exactly one zero.

Problem IV (20 points)
Find a positive number for which the sum of it and its reciprocal is the smallest (least) possible.

Problem V (20 points)
Show that the value of $\int_0^1 \sin(x^2)\ dx$ cannot possibly be 2.