

MATH 100-D200 Instructor: R. Pyke

Midterm 1, October 3, 2007

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1. DO NOT LIFT UP THE COVER PAGE UNTIL INSTRUCTED.
2. Clearly explain your answer. No credit will be given for just writing down the answer.
3. If the answer space provided is not sufficient, write your answer on the back of the previous page.
4. Ordinary Scientific Calculators ONLY are allowed.
NO GRAPHING CALCULATORS ALLOWED.
5. **Copying someone else's test, or deliberately exposing written papers to the view of others is forbidden and will result in a score of zero and disciplinary action.**

Question	Score	Max
1		5
2		5
3		5
4		6
5		8
6		5
7		5
8		15
Total		54

- (1) [Marks: 5] Solve the following inequality. Express your answer in interval notation.

$$\left| \frac{4x + 1}{x - 1} \right| > 2$$

- (2) [Marks: 5] Find two points on the y -axis that are a distance of 2 units from the circle $(x - 3)^2 + (y - 4)^2 = 4$ (begin by making a sketch!).

- (3) [Marks: 5] Find the centre and radius of the following circle;

$$12y - 16x - 2y^2 - 14 - 2x^2 = 30$$

- (4) [Marks: 6] Determine whether the graphs of the following equations possess symmetry with respect to the x -axis, y -axis, or origin, and find any x and y intercepts.

(a) $|3x^2y| = 4$

(b) $2x^3 - y = \frac{x}{y^2 + 1}$

- (5) [Marks: 8] Find the following limits by simplifying the expression first.

(a) $\lim_{t \rightarrow 1} \frac{1}{t-1} \left[\frac{1}{(t+3)^2} - \frac{1}{16} \right]$

(b) $\lim_{h \rightarrow 5} \frac{\sqrt{u+4} - 3}{u-5}$

(6) [Marks:5] Find the domain of the following function.

$$f(x) = \frac{\sqrt{x^2 - 3x - 10}}{x^4 - 16}$$

- (7) [Marks:5] Find the equation of the line that is perpendicular to the line $2x - 3y = 5$ and passes through the point $(-3, 4)$.

- (8) [Marks: 15] Consider the quadratic function $f(x) = -3x^2 + 24x - 36$.

(a) Express the function in standard form and from this find the vertex and axis of symmetry.

(b) Find all intercepts.

(c) Make a sketch of the graph.

(d) Find the points of intersection between this parabola and the line $y = 3x - 3$.

(e) From this, sketch the region in the xy -plane of the points (x, y) that satisfy the inequalities

$$3x - 3 \leq y \leq -3x^2 + 24x - 36$$