

Math 10C - Fall 2017 - Midterm I

Name: _____

Student ID: _____

Section time: _____

Instructions:

Please print your name, student ID and section time.

During the test, you may not use books, calculators, telephones. You may use a "cheat sheet" of notes which should be a page, front only.

Read each question carefully, and show all your work. Answers with no explanation will receive no credit, even if they are correct.

There are 4 questions which are worth 40 points. You have 50 minutes to complete the test.

Question	Score	Maximum
1		11
2		10
3		10
4		9
Total		40

Problem 1. [11 points; 3, 4, 4.]

Consider the vectors

$$\vec{v} = \vec{i} + 2\vec{j}, \quad \vec{w} = 3\vec{i} + \vec{j}.$$

(i) Find the *unit* vector \vec{u} in the direction of \vec{v} .

(ii) Find the component \vec{w}_{\parallel} of \vec{w} in the direction of \vec{u} .

(iii) Find the angle between the vectors \vec{v} and \vec{w} .

Problem 2. [10 points; 5, 5.]

Consider the function

$$f(x, y) = 1 + \sqrt{x^2 + y^2}.$$

- (i) Draw the contour diagram for $f(x, y)$ and clearly label the level curves. Show the contours for at least three levels.

- (ii) Draw the graph of $z = f(x, y)$.

Problem 3. [10 points; 5, 5.]

Consider the points $P(3, 0, -1)$, $Q(1, 1, 0)$ and $R(-1, 1, 2)$.

(i) Find the equation of the plane through P , Q and R .

(ii) Find the area of the triangle PQR .

Problem 4. [9 points; 4, 5.]

Consider the plane P with equation $z = 6x - 3y + 2$.

(i) Find the equation of a plane parallel to P and passing through the point $(1, 0, -1)$.

(ii) For which value of a is the vector $(-2, 1, a)$ normal to the plane?