Dawson College:	Linear Algebra:	201-105-dw-	S04: Fall 2012
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Name:	
Student ID:	

Test 3

This test is graded out of 50 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. Given the following vertices A(1,1,0), B(-2,2,1), C(3,-3,-2).

- a. (3 marks) Find the area of the triangle $\triangle ABC$ using the cross-product.
- b. (3 marks) Find the perimeter of the triangle $\triangle ABC$.
- c. (3 marks) Find the length of the altitude from vertex B to side AC using projections.
- b. (1 mark) Find the area of the triangle $\triangle ABC$ using part c.

Question 2. Given

- a. (2 marks) Are \mathcal{P}_1 and \mathcal{L}_2 parallel, perpendicular, or neither, justify?
- b. (2 marks) Are \mathcal{P}_1 and \mathcal{P}_3 parallel, perpendicular, or neither, justify?
- c. (2 marks) Are \mathcal{P}_2 and \mathcal{P}_3 parallel, perpendicular, or neither, justify?
- d. (2 marks) Are \mathcal{L}_2 and \mathcal{L}_3 parallel, perpendicular, or neither, justify?
- e. (3 marks) Find the point intersection between \mathscr{P}_1 and \mathscr{L}_1 if it exists.

Question 3. (5 marks) Suppose that the initial point of the vector $\mathbf{u} = (1,0,-3)$ lies on the line $(x,y,z) = (-1+2t,t,9-3t)$ where $t \in \mathbb{R}$. Find the angle in radians between the vector and the line.

Question 4. (5 marks) Find the distance between the following two parallel planes

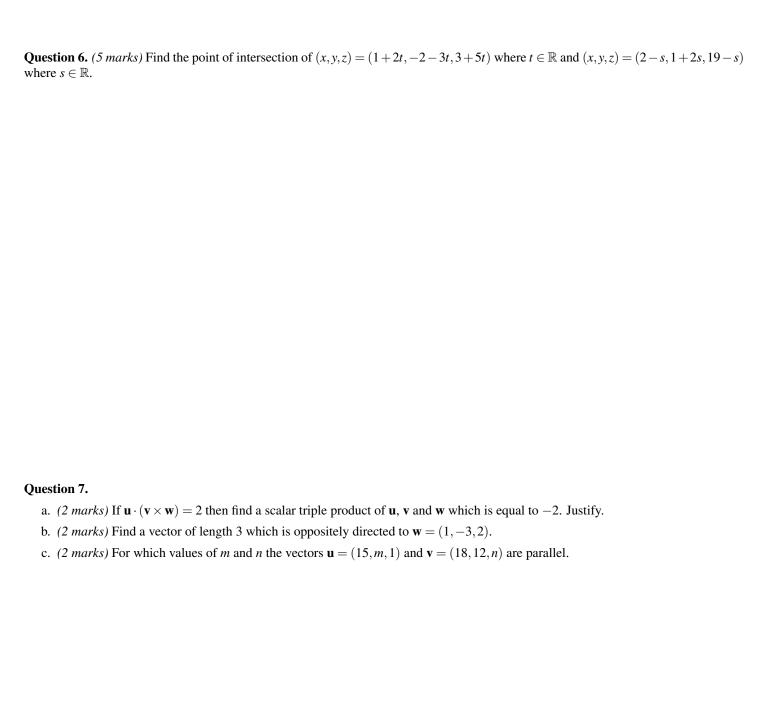
$$\begin{array}{lll} \mathscr{P}_1\colon & x-2y+3z-1 & = & 0 \\ \mathscr{P}_2\colon & -x+2y-3z+3 & = & 0. \end{array}$$

Do NOT use the formula: $D = \frac{|ax_0 + by_0 + cz_0 + d|}{\sqrt{a^2 + b^2 + c^2}}$

Question 5. Given

$$\begin{array}{lll} \mathscr{P}_1\colon & x-3y+3z-1 & = & 0 \\ \mathscr{P}_2\colon & -2x+2y-3z+3 & = & 0. \end{array}$$

- a. (5 marks) Find the intersection of \mathcal{P}_1 and \mathcal{P}_2 .
- b. (3 marks) Find the equation of the plane perpendicular to the intersection of \mathcal{P}_1 and \mathcal{P}_2 and that passes through P(1,2,-3).



Bonus. (5 marks) Find the distance between