Spring 2017 Total Points: 40 Math 20C Exam 1A

Name: ____________________ PID: ____________

- Print your *NAME* on every page and write your *PID* in the space provided above.
- Show all of your work in the spaces provided. No credit will be given for unsupported answers, even if correct.
- Supporting work for a problem must be on the page containing that problem. No scratch paper will be accepted.
- No calculators, tablets, phones, or other electronic devices are allowed during this exam. You may use one page of handwritten notes, but no books or other assistance.

(1 pt) 0. Follow the instructions on this exam and any additional instructions given during the exam.

(6 pt) 1. Let $\mathbf{v} = \mathbf{i} + 3\mathbf{j}$ and let $\mathbf{w} = 3\mathbf{i} + 4\mathbf{j}$. Compute $\mathbf{v} \cdot \mathbf{w}$ and $\mathbf{v} \times \mathbf{w}$. (Simplify completely.)

(9 pt) 2. Let $\mathbf{v} = \mathbf{i} + 3\mathbf{j}$ and let $\mathbf{w} = 3\mathbf{i} + 4\mathbf{j}$ (same as in Question 1). Compute the following:

(a) A unit vector in the direction of $\mathbf{v}$.

(b) The angle between $\mathbf{v}$ and $\mathbf{w}$.

(c) The magnitude of $\mathbf{v} - \mathbf{w}$.

(Your answers may include trigonometric or inverse trigonometric functions.)

(6 pt) 3. Find the equation for the plane through the origin that is perpendicular to both the plane $x + 3y - 2z + 100 = 0$ and the plane $x + 2z = 0$, or show that no such plane exists.

(6 pt) 4. Find the equation for the plane containing the point $(1, 1, 1)$ and perpendicular to both the plane $2x + y - 3z + 2 = 0$ and the line $\vec{\ell}(t) = (1, -2, -7) + t(2, 5, 3)$, or show that no such plane exists. (Check to make sure all requirements are met.)

(6 pt) 5. Find the area of the triangle having vertices at the points $(1, 1, 0)$ and $(3, 4, 2)$ and $(2, 0, 1)$.

(6 pt) 6. Compute the following multivariable limits, or show that the do not exist.

(a) $\lim_{(x,y)\to(0,0)} \dfrac{5x}{x^2+y^2}$

(b) $\lim_{(x,y)\to(0,\frac{\pi}{3})} \dfrac{\cos(xy^2)-1}{2xy^2}$