

Name:

Math 215 Exam 1

October 8, 2015

Directions: WRITE YOUR NAME ON THIS EXAM! Except where indicated, merely finding the answer to a problem is not enough to receive full credit; you must show how you arrived at that answer. IF you convert irrational numbers such as $\sqrt{3}$ or π into decimal approximations, round to at least 4 decimal points.

- 1) Given the vectors $v = \langle -6, 18, -1 \rangle$ and $w = \langle -8, 9, 12 \rangle$, find
- a) (4 points) a unit vector orthogonal to v .
 - b) (4 points) $v \cdot w$.
 - c) (8 points) the length of the vector projection of v onto w .

2) (15 points) Determine the equation of the plane passing through the line of intersection of the planes $-2x + 4z = 3$ and $5x + y - z = 0$ and containing the point $(2, 4, 5)$.

3) (18 points) Find the equation of the tangent line to

$$f(t) = \left\langle \arctan\left(\frac{t}{2}\right), \frac{t+1}{t^2+2}, (t+2)^{\frac{1}{t}} \right\rangle$$

at the point $t = 2$

4) (18 points) Find the arc length of the portion of the graph of

$$f(t) = \langle \sin^3(t), \cos^3(t), \cos^2(t) - \sin^2(t) \rangle$$

from $t = 0$ to $t = \pi/4$.

5) (23 points) Determine

$$\lim_{t \rightarrow \infty} \left\langle \frac{\ln(3t^2 + 4)}{2 \ln(t + 5)}, 7t \tan\left(\frac{9}{t}\right), (1 + 5e^{-t})^{e^t} \right\rangle.$$