Name:

Math 215 Practice Exam 1

1) Given the vectors $v = \langle -6, 7, 2 \rangle$ and $w = \langle 4, -2, 5 \rangle$, find

a) (4 points) $\|v + w\|$

b) (4 points) $2v \cdot w$

c) (6 points) $v \times w$.

(Answers: a)$\sqrt{78}$, b) -56, c) $\langle 39, 38, -16 \rangle$)

2) (15 points) Find the equation of the tangent line to $f(t) = \left\langle \cos(\arctan(t)), \dfrac{t^3 + 1}{t - 2} \right\rangle$

at the point $(\sqrt{2}/2, -2)$. (Answer: $< \sqrt{2}/2, -2 > +t < -\sqrt{2}/4, -5 >$ is one such equation)

3) (15 points) Determine the equation of the plane passing through the point $(-4, 1, 5)$ and containing the line with symmetric equations

$$\frac{x - 1}{2} = y - 7 = \frac{3z - 1}{6}.$$

Hint: find two more points on the plane. (Answer: $\langle -50, 58, 21 \rangle \cdot \langle x + 4, y - 1, z - 5 \rangle = 0$)

4) Find the arc length of the portion of the curve

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

from $t = 0$ to $t = \dfrac{\pi}{2}$. (Answer: $\pi^2\sqrt{5}/8$)

5) Determine

$$\lim_{t\to\infty} \left\langle 3\arctan(t) - \pi/2, t\sin\left(\frac{\pi}{t}\right), \left(\frac{t^2 + \ln(\pi)}{t^2}\right)^{t^2} \right\rangle.$$

You may assume $t > 0$. (Answer: $\langle \pi, \pi, \pi \rangle$)