

Name: \_\_\_\_\_ 10/2/2014  
Math 203 Calculus III Quiz 1

Please show all work and **box your final answers**. If you need more room, you may use the backs of the pages. Calculators are not allowed. Good luck!

1. (4 points) Find the angle between the vectors  $\vec{a} = \langle 4, 0, 2 \rangle$  and  $\vec{b} = \langle 2, -1, 0 \rangle$ . You may leave your answer as a trigonometric expression.

2. (4 points) Give parametric equations for the line that passes through the points  $(2, 1, 2)$  and  $(7, -1, 8)$ .

3. Consider the three points  $P(-2, 3, 2)$ ,  $Q(-1, 1, 5)$ , and  $R(0, 4, 2)$ .
- (a) (4 points) Give an equation for the plane through  $P, Q$ , and  $R$ .

- (b) (4 points) Find the area of the triangle with vertices  $P, Q$ , and  $R$ .

4. Consider the parametrized curve

$$x(t) = \cos t, \quad y(t) = t, \quad z(t) = \sin t, \quad 0 \leq t \leq 6\pi, \quad (\text{parametric})$$

i.e.,

$$\vec{r}(t) = \langle \cos t, t, \sin t \rangle, \quad 0 \leq t \leq 6\pi. \quad (\text{vector})$$

(a) (4 points) Sketch the curve.

(b) (4 points) Find the unit tangent vector to the curve when  $t = 2\pi$ .