

Name: Key

Math 21C - Quiz 3  
Thursday, July 20, 2006

Show all of your steps. You are not required to simplify your answers.

1. [6 pts] If  $\mathbf{u} = \langle 5, 2, -1 \rangle$  and  $\mathbf{v} = \langle 3, 4, 0 \rangle$ , what is  $\mathbf{u} \cdot \mathbf{v}$ ?

$$5 \cdot 3 + 2 \cdot 4 - 1 \cdot 0 = 15 + 8 = 23$$

2. Consider the line segment joining  $(5, 2, -1)$  and  $(3, 4, 0)$ .

- a. [6 pts] What is the midpoint of the line segment?

$$\left( \frac{5+3}{2}, \frac{2+4}{2}, \frac{-1+0}{2} \right) = \left( 4, 3, -\frac{1}{2} \right)$$

- b. [10 pts] Find parametric equations for the line segment.

$$\text{Direction vector } \vec{v} = \langle 5-3, 2-4, -1-0 \rangle = \langle 2, -2, -1 \rangle$$

$$P_0 = (3, 4, 0)$$

$$\left. \begin{array}{l} x = 3 + 2t \\ y = 4 - 2t \\ z = 0 - t \end{array} \right\} 0 \leq t \leq 1$$

3. [8 pts.] Evaluate the indefinite (vector) integral:

$$\int t^3 \mathbf{i} + 7t \mathbf{j} + (t+1) \mathbf{k} \, dt$$

$$\frac{t^4}{4} \mathbf{i} + 7t \mathbf{j} + \left( \frac{t^2}{2} + t \right) \mathbf{k} + \vec{C}$$

2b (alternate solution)

$$\text{Direction vector } \vec{v} = \langle 3-5, 4-2, 0-(-1) \rangle = \langle -2, 2, 1 \rangle$$

$$P_0 = (5, 2, -1)$$

$$\left. \begin{array}{l} x = 5 - 2t \\ y = 2 + 2t \\ z = -1 + t \end{array} \right\} 0 \leq t \leq 1$$