Student ID:

Student Name:

Serial Number:

MATH201, Section 2
Fall 2018, Term 181
Instructions: Show Your Work!

Quiz 2
Version A

1. (3 pts) Find the shortest distance between the spheres

$$x^2+y^2+z^2=4 \quad \text{and} \quad x^2+y^2+z^2=4x+4y+4z-11.$$

2. (3 pts) Let $O(0,0), A(1,-1), B(2,\alpha)$ and $C(\beta,1)$ be points in $\mathbb{R}^2$. Find values of α and β such that the vectors $\vec{AB}$ and $\vec{OC}$ are parallel.

3. (4 pts) Find the scalar and vector projections of $\mathbf{v}$ onto $\mathbf{u}$ where

$$\mathbf{u}=3\mathbf{i}-3\mathbf{j}+\mathbf{k}, \quad \mathbf{u}=2\mathbf{i}+4\mathbf{j}-\mathbf{k}$$

4. (2 pts) **(bonus)** The vector

$$\text{orth}_{\mathbf{a}}\mathbf{b}=\mathbf{b}-\text{proj}_{\mathbf{a}}\mathbf{b}$$

is called an **orthogonal projection** of $\mathbf{b}$. Show that $\text{orth}_{\mathbf{a}}\mathbf{b}$ is orthogonal to $\mathbf{a}$

Student ID:

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MATH201, Section 3
Fall 2018, Term 181

Quiz 2
Version B

Instructions: Show Your Work!

1. (3 pts) Find an equation of the set of all points whose distances from the point $A(0,3,0)$ are **double** their distances from the origin. Describe the set.

2. (3 pts) Let $O(0,0), A(1,-1), B(2,\alpha)$ and $C(\beta,1)$ be points in $\mathbb{R}^2$. Find values of α and β such that the vectors $\vec{AB}$ and $\vec{OC}$ are parallel.

3. (4 pts) Find the scalar and vector projections of $\mathbf{v}$ onto $\mathbf{u}$ where

$$\mathbf{u} = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}, \quad \mathbf{u} = 5\mathbf{i} - \mathbf{k}$$

4. (2 pts) **(bonus)** The vector

$$\text{orth}_{\mathbf{a}}\mathbf{b} = \mathbf{b} - \text{proj}_{\mathbf{a}}\mathbf{b}$$

is called an **orthogonal projection** of $\mathbf{b}$. Show that $\text{orth}_{\mathbf{a}}\mathbf{b}$ is orthogonal to $\mathbf{a}$