

MA2160
Section: R02
Hour Exam#1
Fall 2007
DTL

Name: _____

Score: _____ / 100

- You must show all of your work to receive credit. Work done only in your head is impossible to grade without major surgery.
 - I am attempting to discover your thinking processes as they relate to mathematics and the **solution techniques taught in this course**. You must indicate these processes. Do not be tempted by the dark side and do your work in your head without fully explaining what you did. In other words, answers without mathematical support receive ZERO credit.
 - **Box in your final answer.**
 - NO BOOKS or NOTES can be used on this test.
 - Calculators may be used except as indicated
 - Express your answers in "exact" form on **non-calculator problems**
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1. Given point $P:(5, -2, 1)$ and point $Q:(2, 4, 2)$ find:
- a. The vector \vec{v} **from** P to Q (5 points)
- b. The length of vector \vec{v} (5 points)
- c. The direction of vector \vec{v} (5 points)

- d. Find a vector of length 6 that points in the opposite direction to vector \vec{v}
(5 points)
2. A plane is flying southwest at a speed of 200 mph. Find its velocity vector assuming north is in the positive y direction in the Cartesian coordinate system.
(5 points)
3. Find the dot product of the vectors: $\vec{A} = -3\hat{i} + \hat{j} + 2\hat{k}$ and $\vec{B} = 4\hat{i} + 2\hat{j} - 5\hat{k}$.
(5 points)
4. Find the **vector projection** of vector $\hat{v} = -3\hat{i} + 2\hat{j}$ **onto** vector $\vec{w} = 3\hat{i} + 4\hat{j}$.
(5 points)

5. Find the **angle in degrees** between vector $\hat{v} = 2\hat{i} - \hat{j}$ and vector $\vec{w} = 3\hat{i} + 4\hat{j}$
(5 points)

5. Find the equation of a plane containing the point $(2, 6, 1)$ that is normal to the vector
 $\vec{N} = \hat{i} + 4\hat{j} + 2\hat{k}$ (5 points)

6. Find $\vec{u} \times \vec{v}$ where $\vec{u} = \hat{i} + 2\hat{j} - 2\hat{k}$ and $\hat{v} = 3\hat{i} + \hat{k}$
(5 points)

6. Evaluate the following integrals using the method of “substitution”.
Calculators NOT allowed.

a. $\int \frac{x^2}{\sqrt{x^3 + 1}} dx$

(5 points)

b. $\int_1^2 x^2 \sqrt{x^3 + 8} dx$

(10 points)

7. Evaluate the following integrals using the method of "integration-by-parts".
Calculators NOT allowed.

a. $\int x^2 e^{4x} dx$ (repeated integration-by-parts) (10 points)

b. $\int x^2 \ln(x) dx$ (5 points)

c. $\int e^{2x} \sin(x) dx$ (Solve for unknown integral) (10 points)

8. Split the following expression into its **Partial Fractions**, using the method of **undetermined coefficients**. **Calculators NOT allowed.**

$$\frac{6x+7}{(x+2)^2} \quad (10 \text{ points})$$