1. (10) Integrate

$$\int xe^{2x}\,dx.$$

2. (10) Integrate

$$\int \frac{\cos^3(\sqrt{x})}{\sqrt{x}}\, dx.$$

3. (10) Integrate

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

Remember to put your answer in term of x.

4. (15) Let the origin O be the vertex of a parallelogram and let $P = (1, 0, -4)$ and $Q = (2, 2, 5)$ be the vertices adjacent to O.

(a) What is the area of the parallelogram? You need not simplify your answer.

(b) What is the cosine of the angle between the side OP and the diagonal from O to the vertex opposite O?

5. (10) Find an equation of the plane which contains the point $(1, 2, 3)$ and the line given by $x = 4 + t,\ y = 5 + 2t,\ z = 3 - t$.

6. (15) Let L be the line given by $x = 1 + t,\ y = -3 + 4t,\ z = -2t$, let P_1 be the plane whose equation is $x + y + z = 4$ and let P_2 be the plane whose equation is $2x - y + 3z = 0$.

(a) Find the point of intersection of L and P_1.

(b) Find parametric equations of the line of intersection of P_1 and P_2.

7. (10) Let a curve in 3-space be given by

$$\mathbf{r}(t) = \langle \sin(3t), \cos(3t), \sqrt{7}t \rangle$$

from $t = 0$ to $t = 1$. Find the length of the curve.

8. (20) Multiple choice. Circle the correct response. You need not show your work. No partial credit will be given.

(a) Let $\mathbf{u}$ and $\mathbf{v}$ be non-parallel vectors and denote the scalar projection of $\mathbf{v}$ onto $\mathbf{u}$ by $\text{comp}_{\mathbf{u}}\mathbf{v}$. If $\text{comp}_{\mathbf{u}}\mathbf{v} = -2$, then the angle between $\mathbf{u}$ and $\mathbf{v}$ is

A. $< \frac{\pi}{2}$ *B.* $\frac{\pi}{2}$ *C.* $> \frac{\pi}{2}$ *D.* π *E.* None of these

(b) The parallelepiped spanned by the vectors $\langle 1, 0, 2\rangle$, $\langle 3, 1, 1\rangle$ and $\langle 1, 2, 5\rangle$ has volume

A. 8 *B.* 9 *C.* 10 *D.* 13 *E.* None of these

(c) If $\mathbf{v} \cdot \mathbf{w} = 0$, then $\mathbf{v} \times (\mathbf{v} \times \mathbf{w})$ is

A. Perpendicular to $\mathbf{w}$ *B.* Equal to the zero vector *C.* Parallel to $\mathbf{w}$ *D.* Not defined *E.* None of these

(d) Let $\mathbf{r}(t) = \langle 2t^3, e^t, \cos(\pi t)\rangle$. Then

$$\lim_{h\to 0} \frac{\mathbf{r}(2+h) - \mathbf{r}(2)}{h} =$$

A. $\langle 16, e^2, 1\rangle$ *B.* $\langle 24, e^2, 0\rangle$ *C.* $\langle 16, e, 1\rangle$ *D.* $\langle 24, 2e, 1\rangle$ *E.* None of these

(e) A particle moving in space has acceleration at time t given by

$$\mathbf{a}(t) = \langle 2, 6t, 12t^2\rangle$$

and has initial velocity $\mathbf{v}(0) = \langle 1, 0, 0\rangle$. Then its velocity $\mathbf{v}(t)$ at time t is

A. $\langle 3, 3, 4\rangle$ *B.* $\langle 0, 6, 24t\rangle$ *C.* $\langle 2t+1, 3t^2, 4t^3\rangle$ *D.* $\langle 2t+1+C_1, 3t^2+C_2, 4t^3+C_3\rangle$ *E.* None of these

NAME : _____

SECTION : (circle one) Arkowitz (10 hour) Weber (11 Hour) Mainkar (12 hour)

Math 8

12 November 2007
Hour Exam 2

INSTRUCTIONS: This is a closed book exam and no notes are allowed. You are not to provide or receive help from any outside source during the exam except that you may ask the instructor for clarification of a problem. You have two hours and you should attempt all problems.

- **Except in Problem 8, you must show all work and give a reason (or reasons) for your answer. A CORRECT ANSWER WITH INCORRECT WORK WILL BE CONSIDERED WRONG.**
- ***Print*** your name in the space provided and circle your instructor's name.
- Sign the FERPA release on the next page *only if* you wish your exam returned in lecture.
- Calculators or other computing devices are not allowed.
- Use the blank page at the end of the exam for scratch work.

FERPA RELEASE: Because of privacy concerns, we are not allowed to return your graded exams in lecture without your permission. If you wish us to return your exam in lecture, please sign on the line indicated below. Otherwise, you will have to pick your exam up in your instructor's office after the exams have been returned in lecture.

SIGN HERE: _____.

Problem	Points	Score
1	10	
2	10	
3	10	
4	15	
5	10	
6	15	
7	10	
8	20	
Total	100	