

NAME \_\_\_\_\_

STUDENT ID \_\_\_\_\_

REC. INSTR. \_\_\_\_\_ REC. TIME \_\_\_\_\_

SECTION NUMBER \_\_\_\_\_ LECTURER \_\_\_\_\_

## INSTRUCTIONS:

1. This package contains 13 problems, each worth 8 points.
  2. Fill in the information requested above and on the mark-sense sheet.
  3. Mark your answers on the mark-sense sheet and show work in this booklet.
  4. No books or notes or calculators may be used.
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1. The sphere with equation

$$x^2 + y^2 + z^2 - x + y - 6z + \frac{1}{2} = 0$$

has radius

- A. 2
- B. 3
- C. 4
- D. 5
- E. 6

2. The angle between the vectors  $-4\mathbf{i} - 5\mathbf{j} + 7\mathbf{k}$  and  $\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$  is

- A. 0
- B.  $\pi/6$
- C.  $\pi/4$
- D.  $\pi/3$
- E.  $\pi/2$

3.  $(\mathbf{i} + \mathbf{j} - 2\mathbf{k}) \times (2\mathbf{i} - 3\mathbf{j} + \mathbf{k}) =$

- A.  $5\mathbf{i} + 5\mathbf{j} + 5\mathbf{k}$
- B.  $3\mathbf{i} + 3\mathbf{j} + 3\mathbf{k}$
- C.  $\mathbf{i} + \mathbf{j} + \mathbf{k}$
- D.  $-3\mathbf{i} - 3\mathbf{j} - 3\mathbf{k}$
- E.  $-5\mathbf{i} - 5\mathbf{j} - 5\mathbf{k}$

4. A person pulls a sled 100 ft. along horizontal snow covered ground with a rope that makes an angle of  $\pi/3$  with the horizontal. The tension in the rope is 10 pounds. Find the work done.

- A. 1000 foot-pounds
- B.  $500\sqrt{3}$  foot-pounds
- C.  $500\sqrt{2}$  foot-pounds
- D. 500 foot-pounds
- E. None of the above

5. Let  $\mathbf{a} = \mathbf{i} + \mathbf{j}$ ,  $\mathbf{b} = \mathbf{j} + \mathbf{k}$ . The  $x$  coordinate of the unit vector in the direction  $\mathbf{a} \times \mathbf{b}$  is

A. 0

B.  $-1/\sqrt{3}$

C.  $1/\sqrt{3}$

D.  $-1/\sqrt{5}$

E.  $1/\sqrt{5}$

6.  $\lim_{x \rightarrow 0} \frac{x \sin x}{e^x - 1 - x} =$

A. 1

B. 2

C.  $\sqrt{e}$

D.  $e$

E.  $\infty$

7.  $\lim_{x \rightarrow 0^+} x^{\sqrt{x}} =$

- A. 1
- B. 2
- C.  $\sqrt{e}$
- D. 0
- E.  $\infty$

8.  $\int t \cos \frac{t}{2} dt =$

- A.  $t^2 \sin \frac{t}{2} + C$
- B.  $\frac{t^2}{2} \sin \frac{t^2}{4} + C$
- C.  $\frac{t^2}{2} \cos \frac{t}{2} - t \sin \frac{t}{2} + C$
- D.  $2t \sin \frac{t}{2} + 4 \cos \frac{t}{2} + C$
- E.  $2t \sin \frac{t}{2} - t^2 \cos \frac{t}{2} + C$

9.  $\int_0^4 (x-1)e^{x/3} dx =$

A.  $2e^{4/3} - 1$

B. 12

C.  $3 - 9e^{4/3}$

D. 4

E.  $3e^{4/3} + 1$

10.  $\int_0^{\pi/2} \cos^3 2u \sin^2 2u du =$

A. 1/4

B. 1/10

C. 0

D. 2/5

E. -2/5

11. In computing  $\int x\sqrt{-3-4x-x^2} dx$ , which substitution should be used?

- A.  $x = \sqrt{y}$
- B.  $x + 2 = \sqrt{y}$
- C.  $3 - 4x - x^2 = \sin^2 y$
- D.  $x + 2 = \tan y$
- E.  $x + 2 = \sin y$

12. The form of the partial fraction decomposition of  $\frac{x+1}{x^2+2x^3}$  will be

- A.  $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{2x+1}$
- B.  $\frac{A}{x^2} + \frac{Bx+C}{2x+1}$
- C.  $\frac{A}{x^2} + \frac{B}{2x+1}$
- D.  $\frac{Ax+B}{x^2+2x^3} + \frac{C}{2x+1}$
- E.  $\frac{A}{x} + \frac{B}{2x^2+x} + C$

13.  $\int_{-3}^3 \frac{6 dx}{x^2 + 9} =$

A. 0

B.  $\pi/2$

C.  $\pi$

D.  $12 \ln 18$

E.  $6 \ln 9$