NAME _____

STUDENT ID _____

REC. INSTR. _____ REC. TIME _____

INSTRUCTIONS:

1. Verify that you have all the pages (there are 5 pages).
2. Fill in your name, your student ID number, and your recitation instructor's name and recitation time above. Write your name, your student ID number and division and section number of your recitation section on your answer sheet, and fill in the corresponding circles.
3. Mark the letter of your response for each question on the mark–sense answer sheet.
4. There are 12 problems worth 8 points each.
5. No books or notes or calculators may be used.

$$\int \sec(x)\,dx = \ln|\sec(x)+\tan(x)| + C$$

$$\sin^2 x = \frac{1-\cos(2x)}{2} \qquad \cos^2 x = \frac{1+\cos(2x)}{2}$$

$$\sin(2x) = 2\sin x \cos x \qquad 1+\tan^2 x = \sec^2 x$$

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1. A parallelogram has two adjacent sides given by the vectors $\mathbf{u} = \mathbf{i} + \mathbf{k}$ and $\mathbf{v} = \mathbf{j} + \mathbf{k}$. The area of the parallelogram is

   A. 1
   B. $\sqrt{2}$
   C. 2
   D. $\sqrt{3}$
   E. 3

2. The sphere $x^2 + y^2 + z^2 = 2\sqrt{2}x - 6y + 10z$ has radius

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

3. If $\mathbf{a} = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$ and $\mathbf{b} = \mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$ then the cosine of the angle θ between $\mathbf{a}$ and $\mathbf{b}$ is

A. $\frac{3}{7}$
B. $\frac{7}{3}$
C. $\frac{\sqrt{7}}{3}$
D. $\frac{3}{\sqrt{7}}$
E. $\sqrt{\frac{3}{7}}$

4. $\int x^3 \cos 2x dx = F(x) - \frac{3}{2}\int x^2 \sin 2x\, dx$. Which of the following choices for $F(x)$ makes the equation true?

A. $\frac{1}{2}x^3 \cos 2x$
B. $\frac{1}{3}x^2 \sin 2x$
C. $\frac{1}{2}x^3 \sin 2x$
D. $\frac{1}{2}x^2 \sin 2x$
E. $3x^2 \cos 2x$

5. $\lim_{x\to 0} \dfrac{\cos(\pi x) - 1}{x^2} =$

A. 0

B. -1

C. $-\pi$

D. $-\frac{\pi^2}{2}$

E. $-\frac{\pi^3}{3}$

6. $\lim_{x\to 0} (1+x)^{\frac{2}{x}} =$

A. 1

B. 2

C. $\ln 2$

D. e

E. e^2

7. $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^3 x \, dx =$

A. $\frac{1}{7}$

B. $\frac{2}{35}$

C. $\frac{1}{35}$

D. $\frac{1}{5}$

E. 1

8. $\displaystyle\int_0^{\frac{\pi}{4}} \tan x \sec^4 x \, dx =$

A. 1
B. $\frac{1}{2}$
C. $\frac{1}{3}$
D. $\frac{1}{4}$
E. $\frac{3}{4}$

9. $\displaystyle\int_0^1 \frac{3t+8}{t^2+5t+6}\, dt =$

A. $\ln(2)$
B. $\ln(3)$
C. $\ln(3)+\ln(2)$
D. $\ln(3)+2\ln(2)$
E. $\ln(3)-\ln(2)$

10. The form of partial fraction expansion of $\dfrac{x^3+1}{x^4+x^2}$ is

A. $\dfrac{A}{x^2}+\dfrac{B}{x}$
B. $\dfrac{A}{x^2}+\dfrac{Bx+C}{x^2+1}$
C. $\dfrac{A}{x^2}+\dfrac{B}{x}+\dfrac{Cx+D}{x^2+1}$
D. $\dfrac{A}{x}+\dfrac{Bx+C}{x^2+1}$
E. $\dfrac{A}{x^2}+\dfrac{B}{x^2+1}$

11. $\displaystyle\int \frac{2x^2}{\sqrt{1-x^2}}\,dx =$

A. $-2\sqrt{1-x^2}+C$

B. $\sin^{-1}(x)-\sqrt{1-x^2}+C$

C. $2\sqrt{1-x^2}+C$

D. $\sin^{-1}(x)-x\sqrt{1-x^2}+C$

E. $\sin^{-1}(x)-\frac{x}{\sqrt{1-x^2}}+C$

12. The value of the integral $\displaystyle\int_0^\infty \frac{1}{(1+x)^{\frac{3}{2}}}\,dx$ is

A. divergent

B. $\frac{3}{2}$

C. $\frac{1}{2}$

D. 1

E. 2