From snider@math.purdue.edu Tue Jun 19 09:48:21 2001 Date: Tue, 19 Jun 2001 09:23:23 -0500 (E
From: Judy Snider ¡snider@math.purdue.edu¿ To: lankr@math.purdue.edu

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. Sign the answer sheet.

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.

6. Please hand in both your answer sheet and exam to your recitation instructor,

---

$$\int \sec x \; dx = \ln|\sec x + \tan x| + C$$

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

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

$$\sin(2x) = 2 \sin x \cos x$$

---

1. The sphere with equation $x^2 + y^2 + z^2 - 2x + 4y + 6z = 2$ has radius

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

2. The parallelogram determined by $\mathbf{i} - 2\mathbf{k}$ and $\mathbf{i} - 2\mathbf{j} + \mathbf{k}$ has area

   A. $\sqrt{5}$
   B. $\sqrt{14}$
   C. $\sqrt{21}$
   D. $\sqrt{29}$
   E. $\sqrt{34}$

3. Find the angle between the vectors $\mathbf{i} - 2\mathbf{j} - 2\mathbf{k}$ and $2\mathbf{i} + \mathbf{j} - 2\mathbf{k}$.

   A. $\cos^{-1}\left(\frac{4}{9}\right)$
   B. $\cos^{-1}\left(\frac{8}{9}\right)$
   C. $\cos^{-1}\left(\frac{4}{81}\right)$
   D. $\cos^{-1}\left(\frac{8}{81}\right)$
   E. $\frac{\pi}{2}$

4. Let R be the region bounded by the curves
$y = \sqrt{2x+3}$, $y = 0$, $x = 1$, and $x = 2$.
Find the volume of the solid obtained by rotating R about the x-axis.

A. 6π

B. 8π

C. 10π

D. 12π

E. 14π

5. Let R be the region bounded by the curves $x = 2 - y^2$ and $x = y^2$. Find the area of R

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

B. $\frac{4}{3}$

C. 2

D. $\frac{8}{3}$

E. $\frac{10}{3}$

6. The base of a solid S is the region in the xy-plane bounded by the curves $y = x$, $y = 2x$, and $x = 3$. Cross sections of S perpendicular to the x-axis are semicircles. Which integral represents the volume of S?

A. $\int_0^3 \pi[(2x)^2 - x^2]dx$

B. $\int_0^3 \frac{\pi}{2}\left(\frac{x}{2}\right)^2 dx$

C. $\int_0^3 \frac{\pi}{2}[(2x)^2 - x^2]dx$

D. $\int_0^3 \pi x^2 dx$

E. $\int_0^3 2\pi x^2 dx$

7. The region enclosed by $y = 5x - 2x^2$ and $y = 2x - x^2$ is rotated about the line $x = -1$ to generate a solid S. The volume of S equals

   A. $2\pi \int_0^3 x(3x - x^2)dx$

   B. $2\pi \int_{-3}^0 x(3x - x^2)dx$

   C. $2\pi \int_0^3 (x + 1)(3x - x^2)dx$

   D. $2\pi \int_0^3 (x - 1)(3x - x^2)dx$

   E. $2\pi \int_{-3}^0 (x - 1)(3x - x^2)dx$

8. A force of 8 lbs is required to hold a spring stretched 6 in. beyond its natural length. How much work is done in stretching it from 6 in. to 1 ft. beyond its natural length?

   A. 2 ft-lb

   B. 3 ft-lb

   C. 4 ft-lb

   D. 5 ft-lb

   E. 6 ft-lb

9. A cable that weighs 1.5 lb/ft is used to lift a 200 lb weight up a well 10 ft deep. Find the amount of work done.

   A. 2015 ft-lb

   B. 2030 ft-lb

   C. 2045 ft-lb

   D. 2060 ft-lb

   E. 2075 ft-lb

10. $\int_0^2 te^{2t}dt =$

A. $\frac{1}{2}(3e^4+1)$

B. $\frac{1}{4}(3e^4+1)$

C. e^4+1

D. $\frac{1}{4}(3e^4-1)$

E. $\frac{1}{2}(3e^4-1)$

11. $\int_0^{\frac{\pi}{3}} \tan^3 x \sec^2 x\, dx =$

A. 1

B. 2

C. 3

D. $1\frac{1}{4}$

E. $2\frac{1}{4}$

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

A. $\frac{1}{3}$

B. $\frac{1}{6}$

C. $\frac{1}{12}$

D. $\frac{1}{4}$

E. $\frac{2}{15}$