**MA 162** **Exam 2** **Spring 2008**

Name______________________________________________

10-digit PUID______________________________________

RECITATION Division and Section Numbers______________________

Recitation Instructor_________________________________

Instructions:

1. Fill in all the information requested above and on the scantron sheet.
2. This booklet contains 17 problems. Problems 11 and 13 are worth 5 points each. The rest of the Problems are worth 6 points each. The maximum score is 100 points.
3. For each problem mark your answer on the scantron sheet and also circle it in this booklet.
4. Work only on the pages of this booklet.
5. Books, notes, calculators or any electronic devices are not to be used on this test.

1. What's an appropriate trig substitution for the integral $\int x^3\sqrt{4-9x^2}\,dx$?

A. $3x = 2\sin(\theta)$

B. $3x = 2\tan(\theta)$

C. $3x = 2\sec(\theta)$

D. $2x = 3\sin(\theta)$

E. $2x = 3\tan(\theta)$

2. Using an appropriate trig substitution, the corresponding $\theta$ limits of integration of the integral $\int_{\sqrt{3}}^{3} \frac{x^3}{\sqrt{x^2+9}}\,dx$ are

A. $\int_{\pi/4}^{\pi/6}$

B. $\int_{\pi/6}^{\pi/4}$

C. $\int_{\pi/3}^{\pi/4}$

D. $\int_{\pi/6}^{\pi/3}$

E. $\int_{\pi/3}^{\pi/2}$

3. Using an appropriate trig substitution, $\int \frac{\sqrt{x^2-1}}{x}\,dx =$

A. $\int \tan(\theta)\sec(\theta)\,d\theta$

B. $\int \sin(\theta)\cos(\theta)\,d\theta$

C. $\int \sin^2(\theta)\,d\theta$

D. $\int \sec^2(\theta)\,d\theta$

E. $\int \tan^2(\theta)\,d\theta$

4. What's an appropriate trig substitution for the integral $\displaystyle\int \frac{\sqrt{4x - x^2}}{3x}\, dx$?

A. $x - 2 = 3\sin(\theta)$

B. $x - 4 = 2\sin(\theta)$

C. $x - 2 = 3\tan(\theta)$

D. $x - 2 = 2\sin(\theta)$

E. $x - 4 = 2\tan(\theta)$

5. The form of the partial fraction decomposition of $\dfrac{162x}{x^4 - 16}$ is

A. $\dfrac{Ax + B}{x^2 - 4} + \dfrac{Cx + D}{(x^2 - 4)^2}$

B. $\dfrac{A}{x - 4} + \dfrac{B}{x + 4}$

C. $\dfrac{A}{x - 2} + \dfrac{B}{x + 2} + \dfrac{Cx + D}{x^2 + 4}$

D. $\dfrac{A}{x - 2} + \dfrac{B}{x + 2} + \dfrac{C}{x^2 + 4}$

E. $\dfrac{A}{x^2 - 4} + \dfrac{B}{x^2 + 4}$

6. $\displaystyle\int \frac{3x}{(x-1)(x+2)}\, dx =$

A. $\ln|x - 1| + 2\ln|x + 2| + C$

B. $\ln|x - 1| - 2\ln|x + 2| + C$

C. $\ln|x - 1| + \ln|x + 2| + C$

D. $2\ln|x - 1| + \ln|x + 2| + C$

E. $2\ln|x - 1| - 2\ln|x + 2| + C$

7. From a table of integrals, it appears the integral $\int \frac{\sqrt{9x^2-4}}{12x}\,dx$ is closest in form to $\int \frac{\sqrt{u^2-a^2}}{u}\,du$. With an appropriate substitution, $\int \frac{\sqrt{9x^2-4}}{12x}\,dx =$

A. $\frac{1}{4}\int \frac{\sqrt{u^2-2^2}}{u}\,du$

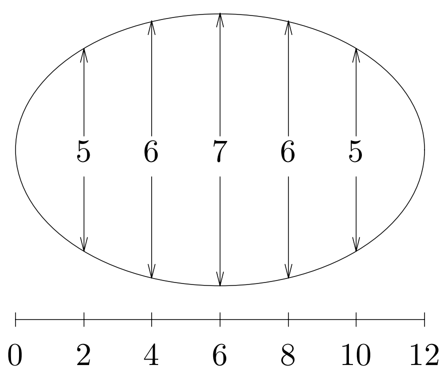
B. $\frac{1}{36}\int \frac{\sqrt{u^2-2^2}}{u}\,du$

C. $\frac{1}{12}\int \frac{\sqrt{u^2-2^2}}{u}\,du$

D. $12\int \frac{\sqrt{u^2-2^2}}{u}\,du$

E. $\frac{2}{3}\int \frac{\sqrt{u^2-2^2}}{u}\,du$

8. A pool, 12 yards long, is shaped like an oval. The distance, in yards, across the pool, at 2 yard intervals, is shown below. Find the DIFFERENCE between $T_6$, the trapezoidal approximation of the area of the pool and $M_3$, the midpoint approximation of the area of the pool.




A. 12

B. 10

C. 8

D. 5

E. 2.5

9. $\displaystyle\int_{-1}^{2} \frac{1}{x}\, dx =$

A. $\ln\left(\dfrac{1}{2}\right)$

B. $\ln(2)$

C. $\dfrac{3}{4}$

D. $\dfrac{5}{4}$

E. Diverges

10. $\displaystyle\int_{1}^{\infty} \frac{1}{(2x+2)^3}\, dx =$

A. $\dfrac{1}{16}$

B. $\dfrac{1}{128}$

C. $\dfrac{1}{32}$

D. $\dfrac{1}{64}$

E. Diverges

11. Find the length of the curve $y = 3 + 2x^{3/2}$, $\;1 \le x \le 2$.

A. $\dfrac{2}{27}\left(19^{3/2} - 10^{3/2}\right)$

B. $\dfrac{2}{27}\left(21^{3/2} - 13^{3/2}\right)$

C. $\dfrac{1}{3}\left(21^{3/2} - 13^{3/2}\right)$

D. $4\sqrt{2} - 1$

E. $4\sqrt{2} + 1$

12. The curve $y = x^5, \quad 0 \le x \le 1$ is rotated about the $y$–axis. The surface area of the resulting surface of revolution is

A. $\displaystyle\int_0^1 2\pi x\sqrt{1+x^{10}}\ dx$

B. $\displaystyle\int_0^1 2\pi x^5\sqrt{1+x^{10}}\ dx$

C. $\displaystyle\int_0^1 2\pi x\sqrt{1+25x^8}\ dx$

D. $\displaystyle\int_0^1 2\pi x^5\sqrt{1+25x^8}\ dx$

E. $\displaystyle\int_0^1 2\pi x\sqrt{1+5x^4}\ dx$

13. A plane region is bounded by $y = x^2, y = 0$ and $x = 2$. Find the $y$–coordinate, $\overline{y}$, of its centroid.

A. $\overline{y} = \dfrac{4}{5}$

B. $\overline{y} = \dfrac{2}{5}$

C. $\overline{y} = \dfrac{7}{5}$

D. $\overline{y} = 1$

E. $\overline{y} = \dfrac{6}{5}$

14. A plane region in the first quadrant has centroid $(3, 4)$ and area 7 square units. The volume of the solid generated by revolving the region about the line $x = -2$ is

A. $84\pi$ cubic units

B. $70\pi$ cubic units

C. $56\pi$ cubic units

D. $42\pi$ cubic units

E. $35\pi$ cubic units

15. Determine whether the sequence $a_n = \dfrac{n^2+1}{n^2}$ converges or diverges. If it converges, find the limit.

A. Converges to 2

B. Converges to 1

C. Converges to 0

D. Converges to 1/2

E. Diverges

16. Determine whether the sequence $a_n = \sin(n/3)$ converges or diverges. If it converges, find the limit.

A. Converges to 0

B. Converges to 1

C. Converges to $\pi/3$

D. Converges to $\dfrac{\sqrt{3}}{2}$

E. Diverges.

17. Determine whether the sequence $a_n = \dfrac{2^{n-1}}{3^{n+2}}$ converges or diverges. If it converges, find the limit.

A. Converges to $\dfrac{2}{3}$

B. Converges to 3

C. Converges to $\dfrac{1}{54}$

D. Converges to 0

E. Diverges.