

MATH 75

Test 3

December 10, 2003

Name: _____

- Check all your answers before you turn in this test!

Problem	Value	Score
1	3	
2	3	
3	3	
4	3	
5	3	
6	3	
7	5	
8	5	
9	5	
10	5	
11	6	
12	6	
Total	50	

Multiple choice questions: circle the correct answer

1. Which of the following is an antiderivative of $f(x) = 1 + \sin x$?

- A. $\cos x$ B. $1 - \cos x$ C. $x + \cos x$ D. $1 + x - \cos x$ E. $-x \cos x$

2. $\int_0^1 \sqrt{1-x^2} dx =$

- A. -1 B. 0 C. $\frac{\pi}{4}$ D. $\frac{\pi}{2}$ E. 1

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

- A. $\frac{1}{2\sqrt{2x+1}} + C$ B. $\frac{1}{\sqrt{2x+1}} + C$ C. $\frac{(2x+1)^{3/2}}{6} + C$
D. $\frac{(2x+1)^{3/2}}{3} + C$ E. $\frac{2(2x+1)^{3/2}}{3} + C$

4. If $f(x) = \int_0^x \sqrt{t^2+1} dt$, then $f'(x) =$

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

5. Use Newton's Method to approximate the root of $x^3 - 6x + 4 = 0$. Let $x_1 = 1$. Find x_2 .

- A. -2 B. 0 C. $\frac{2}{3}$ D. $\frac{4}{3}$ E. 4

6. Find the average value of the function $f(x) = \sin(2x)$ on the interval $\left[0, \frac{\pi}{4}\right]$.

- A. $-\frac{2}{\pi}$ B. $-\frac{1}{2}$ C. 0 D. $\frac{1}{2}$ E. $\frac{2}{\pi}$

Regular problems: show all your work

7. A box with a square base and open top must have a volume of $4,000 \text{ cm}^3$. Find the dimensions of the box that minimize the amount of material used.

8. If $f'(x) = 10x^4 + 8x^3 + 6x^2 + 4$ and $f(-1) = 2$, find $f(x)$.

9. Find the area of the region under the graph of $f(x) = \frac{1}{x^2}$ from $x = 1$ to $x = 2$.

10. Find the volume of the solid obtained by rotating about the x -axis the region enclosed by $y = 1 - x^2$ and the x -axis.

11. Find the area of the region enclosed by $x = 2y - y^2$ and $x = y^2 - 2y$.

12. Find the volume of the solid obtained by rotating about $x = 1$ the region under the graph of $f(x) = \sqrt{x}$ from $x = 1$ to $x = 4$.