Math 2

Midterm Exam 1

Name:

Instructor:

Question Number	Points	Score
1	6	
2	5	
3	7	
4	7	
5	3	
6	3	
7	5	
8	5	
9	5	
10	5	
11	5	
12	5	
13	5	
14	5	
15	5	
16	5	
17	9	
18	5	
19	5	

TOTAL SCORE:

1. Estimate the area under the graph of $f(x) = x^2 + 2$ from $x = 0$ to $x = 5$ using 5 approximating rectangles and (a) Left Endpoints; (b) Right Endpoints.

2. Find the exact area under the graph of $f(x) = 2x^3 + 4x^2 + 7x + 6$ from $x = 0$ to $x = 2$ using the Fundamental Theorem of Calculus.

3. Find the exact area under the graph of $f(x) = x^2 + x + 1$ from $x = 0$ to $x = 5$ using the limit definition of the definite integral.

4. Use the limit definition of the definite integral to evaluate $\int_1^5 x^2 dx$.

5. Evaluate the definite integral $\int_1^7 (1+2f(x)-3g(x))dx$ using the fact that $\int_1^7 f(x)dx = 9$ and $\int_1^7 g(x)dx = 11$.

6. Find the derivative of the function $g(x) = \int_3^x \sqrt[3]{t^5+2}dt$.

7. Find the derivative of the function $g(x) = \int_3^{x^3} \sqrt[3]{t^5+2}dt$.

8. Find the derivative of the function $g(x) = \int_{\text{arctan(x)}}^{1} \tan(t)dt$.

9. Evaluate the definite integral $\int_{-\frac{\pi}{2}}^{\pi} (1 + \sin(x))dx$.

10. Let $F(x) = \frac{1}{\sqrt{1-x^2}}$. Evaluate the definite integral $\int_{-\frac{1}{2}}^{\frac{1}{2}} F'(x)dx$.

11. Find the indefinite integral $\int (\frac{3}{x^5} + \frac{2}{\sqrt{x}})dx$.

12. Find the indefinite integral $\int x^2(x^3+1)^2 + x^2(x^3+1)^3 dx$.

13. Let $F(x) = \int 2\sin(x)dx$. Find the formula for $F(x)$, given that $F(\frac{\pi}{2}) = 2$.

14. Evaluate the integral $\int_0^2 (x-1)^{25} dx$.

15. Evaluate the integral $\int \frac{\sin(x)}{1+\cos^2(x)} dx$.

16. What is wrong with this calculation?

$$\int_0^{\pi} \sec^2(x) dx = \tan(\pi) - \tan(0) = 0$$

17. Determine whether each of the folowing functions $f(x)$ is even/odd/neither, and evaluate the integral $\int_{-1}^{1} f(x)dx$.

(a) $f(x) = x\sin(x^2)$

(b) $f(x) = x^2\cos(x^3)$

(c) $f(x) = (x + 1)(x^2 + 1)$

18. Explain exactly what is meant by the statement that "differentiation and integration are inverse processes."

19. State/Describe the substitution rule. Why is it useful in practice? Support your assertion with an example not appearing on this exam.