MATH 131 August 2, 2006

Exam III - Form A

Printed Name: ____

Signature: ____________________________________

(By signing here you acknowledge that all of the work on this test is your own.)

Seat#: ________

Instructions:

- Except for the multiple choice questions where the answer must be circled, you must show appropriate legible work to receive full credit. DO NOT just put an answer.
- There are 100 possible points. Point values for each problem are as indicated.
- Check and make sure there are seven pages of text (including the cover page), when you begin the exam.
- You can use one of the following calculators: TI-83, TI-83Plus, TI-84, or TI-84Plus. You are NOT allowed to use a calculator (like TI-89) that gives you unfair advantage over your classmates!
- SCHOLASTIC DISHONESTY WILL NOT BE TOLERATED.

Good Luck!

Question:	Points	Points Awarded
#1-#11	55	
#12	15	
#13	15	
#14	10	
#15	5	
Total:	100	

1. *(5 points)* The value of the expression $\sum_{i=-2}^{2} \frac{i^2+i}{2}$ is :

   (a) -2
   (b) 0
   (c) 2
   (d) 5
   (e) 6

2. *(5 points)* If $f'(x) = 2x$ and $f(1) = 7$ then the value of $f(10)$ is:

   (a) $x = 93$
   (b) $x = 100$
   (c) $x = 106$
   (d) $x = 107$
   (e) impossible to determine.

3. *(5 points)* If $f(t) = t^4 - 3t^2 + 5\sin(t)$ then an antiderivative for $f(t)$ is:

   (a) $F(t) = t^5 - 3t^3 + 5\cos(t) - 2$
   (b) $F(t) = t^5 - 3t^3 - 5\cos(t) + 7$
   (c) $F(t) = \frac{t^5}{5} - t^3 - 5\cos(t) + 3t$
   (d) $F(t) = \frac{t^5}{5} - t^3 - 5\cos(t) - 2$
   (e) $F(t) = \frac{t^5}{5} - t^3 + 5\cos(t) + 14$

4. *(5 points)* If $F(7) = 45$ and $\int_2^7 F'(x)dx = 7$ then $F(2)$ is:

   (a) $f(2) = 10$
   (b) $f(2) = 38$
   (c) $f(2) = 45$
   (d) $f(2) = 52$
   (e) $f(2) = 80$.

5. *(5 points)* The area under the curve $f(x) = 4x^3 + 1$ (and above the x-axis) between the points $x = 2$ and $x = 3$ is:

   (a) 50
   (b) 66
   (c) 84
   (d) 96
   (e) 110.

6. *(5 points)* If t is measured in months and $R(t)$ in dollars per month, then the units of $\int_0^{12} R(t)dt$ are :

   (a) dollars
   (b) months
   (c) years
   (d) dollars per month
   (e) months per dollar

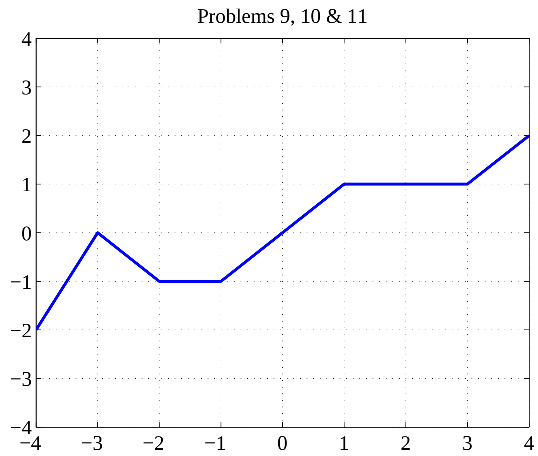
7. *(5 points)* An object is travelling with a velocity given by $f(t) = 2t + 1$ ft/sec on $[0, 2]$. The estimate for the distance traveled using a **right hand sum** with $n = 4$ rectangles is :

   (a) 5 feet
   (b) 6 feet
   (c) 7 feet
   (d) 8 feet
   (e) None of the above.

8. *(5 points)* A cup of hot chocolate has a temperature of $170^o F$ initially, which is decreasing at a rate given by $r(t) = -5e^{-0.1t}$ (in degrees per minute). Estimate the temperature of the hot chocolate after 10 minutes.

   (a) $31.6^o F$
   (b) $84.9^o F$
   (c) $88.4^o F$
   (d) $128^o F$
   (e) $138.4^o F$

To answer the next three problems, use the graph of the function $f(x)$ below.



9. *(5 points)* What is the value of $\int_0^3 f(x)dx$?

   (a) 1
   (b) 2
   (c) 2.5
   (d) 3
   (e) 3.5

10. *(5 points)* What is the value of $\int_{-3}^2 f(x)dx$?

   (a) -0.5
   (b) 0.5
   (c) 1
   (d) 3.5
   (e) 5.5

11. *(5 points)* If $F(x)$ is an antiderivative for our function $f(x)$ and $F(-4) = 8$, then (using the graph above) find $F(3)$.

   (a) $F(3) = 5.5$
   (b) $F(3) = 7.5$
   (c) $F(3) = 10$
   (d) $F(3) = 13.5$
   (e) None of the above.

12. Find the general antiderivative for each of the following problems.

(a) *(5 points)*

$$\int (x + \frac{1}{\sqrt{x}}) dx$$

(b) *(5 points)*

$$\int x \sin(x^2) dx$$

(c) *(5 points)*

$$\int \frac{(\ln z)^2}{z} dz$$

13. Find the area between the functions $f(x) = 2x^2$ and $g(x) = 3 - x^2$ by following the steps below.

   (a) *(5 points)* Find the points of intersection of the two functions.
   (**NOTE:** Do not just put an answer that you guessed! Either justify it, or show how you arrive at it.)

   (b) *(3 points)* Set up the definite integral that represents the area between the functions.

   (c) *(7 points)* Evaluate the definite integral above by finding an antiderivative and applying the Fundamental Theorem of Calculus.

14. After a foreign substance is introduced into the blood, the rate at which antibodies are made is given by

$$r(t) = \frac{t}{t^2+1} \text{ thousands of antibodies per minute,}$$

where time, t, is in minutes.

(a) *(5 points)* Find the general antiderivative of $r(t)$.

(b) *(5 points)* Assuming that there were 1000 antibodies present at time $t = 0$, write a formula for the number of antibodies $Q(t)$ as a function of the time. **Specify the units of** $Q(t)$.

15. *(5 points)* Let $f(x)$ be a function, such that $f''(x) = 0$. If $f(0) = 2$ and $f(1) = 5$, what is $f(2006)$?