Math 75B Midterm III (blue) $/_{100}$ Name: ______________________

Fall 2008

§§Ch. 18, 19, 20A-C (E), 4.6, 4.7, 5.1-5.5 (S)

Things to remember:

1. Please read directions carefully. Raise your hand if you are not sure what a problem is asking.
2. *You must explain your work thoroughly and unambiguously to receive full credit on questions or parts of questions designated as* ***Work and Answer****.*
3. **No calculators or notes are allowed on this exam.**
4. You have 65 minutes to complete your test, unless announced otherwise. Do not spend too long on any one problem. You do not have to do the problems in order. Do the easy ones first. Do not attempt the bonus question until you have completed the rest of the test. Before turning in your test, please make sure you have answered and double-checked all the questions.
5. If you need scratch paper, please raise your hand. You may not use your own paper. When you have finished your exam, please turn in any scratch paper you use.
6. Write your solutions in the space provided for each problem, or provide specific instructions as to where your work is to be found. *Make it clear what you want and don't want graded.* Your final answers should be boxed or circled.
7. Unless directed otherwise, only EXACT ANSWERS will receive full credit (i.e. $\sqrt{2}$, not 1.414).
8. In word problems, give units on all answers (e.g. feet, grams, gallons).
9. Don't stress! I'm rooting for you!

True or False. (15 points) Circle **T** if the statement is *always* true; otherwise circle **F**.

1. $\displaystyle\int_4^x (3t^2 - 1)\,dt = 3x^2 - 1.$ **T** **F**

2. $\displaystyle\int_2^2 \frac{\tan x}{x^2 - 1}\,dx = 0.$ **T** **F**

3. $\displaystyle\int_3^1 5\,dx = -10.$ **T** **F**

4. $\displaystyle\int_0^3 \sqrt{9 - t^2}\,dt = \frac{9\pi}{2}.$ **T** **F**

5. $\displaystyle\int e^{3x-1}\,dx = e^{3x-1}.$ **T** **F**

Multiple Choice. (24 points) *Circle the letter of the best answer.*

1. If $x_1 = 0$ is a first approximation of a root of $f(x) = x^5 + 2x + 1$, then using Newton's Method the second approximation is $x_2 =$

(a) $\frac{3}{2}$ (c) $-\frac{1}{2}$

(b) $\frac{2}{5}$ (d) $-\frac{4}{5}$

2. $\displaystyle\int \frac{3}{t^2}\, dt =$

(a) $\dfrac{3}{t} + C$ (c) $\dfrac{6}{t^3} + C$

(b) $-\dfrac{3}{t} + C$ (d) $-\dfrac{6}{t^3} + C$

3. The area under the graph of $f(x) = \sqrt[3]{x}$ from $x = 2$ to $x = 5$ is

(a) $\displaystyle\lim_{n\to\infty}\left(\sum_{i=2}^{5} \sqrt[3]{x_i} \cdot \frac{3}{n}\right)$ (c) $\displaystyle\lim_{n\to\infty}\left(\sum_{i=1}^{n} \sqrt[3]{x_i} \cdot \frac{3}{n}\right)$

(b) $\displaystyle\lim_{n\to\infty}\left(\sum_{i=1}^{3} \sqrt[3]{x_i} \cdot \frac{2}{n}\right)$ (d) $\displaystyle\lim_{n\to\infty}\left(\sum_{i=1}^{n} \sqrt[3]{x_i} \cdot \frac{5}{n}\right)$

4. $\displaystyle\int_0^{\pi/2} 5\sin\theta\, d\theta =$

(a) 5 (c) 10

(b) -5 (d) 0

5. If $G(x) = \displaystyle\int_3^{x^2} \sec^2 t\, dt$, then $G'(x) =$

(a) $\tan(x^2) - \tan(3)$ (c) $\sec^2(x)$

(b) $2x\sec^2(x^2)$ (d) $\sec^2(x^2)$

6. If $u = \sqrt{x}$, then the integral $\displaystyle\int \frac{\cos^7(\sqrt{x})}{\sqrt{x}}\, dx$ is equivalent to

(a) $\displaystyle\int \frac{\cos(u^7)}{u}\, du$ (c) $\displaystyle\int \frac{\cos^7(u)}{\frac{1}{2}u}\, du$

(b) $\displaystyle\frac{1}{7}\int \cos^7(u)\, du$ (d) $\displaystyle 2\int \cos^7(u)\, du$

Fill-In. (25 points) *If there is no answer to a question, write "NONE."*

1. For each function, fill in the general antiderivative. *Don't forget the +C!*

$f(x)$	$\int f(x)\,dx$	$f(x)$	$\int f(x)\,dx$
x^{25}		$5e^x - 3$	
$\frac{1}{x^5}$		$5\sec^2(5x)$	
$\frac{3}{x}$		$\sin(4x)$	
$\frac{1}{\sqrt{1-x^2}}$		$\frac{1}{1+x^2}$	

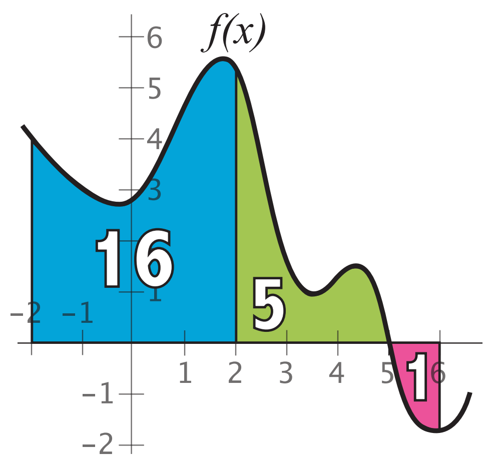
2. The areas of three regions are given below. Using this information, find the following.

(a) $\int_{-2}^{5} f(x)\,dx =$ ____________

(b) $\int_{5}^{6} f(x)\,dx =$ ____________

(c) $\int_{2}^{6} f(x)\,dx =$ ____________

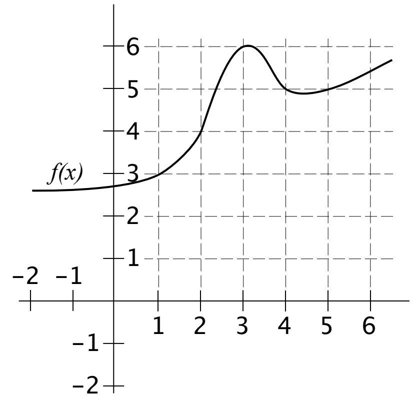
(d) $\int_{2}^{-2} f(x)\,dx =$ ____________



3. $\sum_{i=1}^{5}(i^2 - 1) =$ ____________ .

Graph. (6 points)

For the function $f(x)$ graphed at right, estimate the area under the graph of $f(x)$ from $x = 1$ to $x = 5$ using 4 rectangles and right endpoints. *Write your final answer on the blank below.*



Area ≈ ____________

Work and Answer. (30 points) *You must show all relevant work to receive full credit. Be sure to box or circle your final answers.*

1. Evaluate $\int_1^3 6x^2\,dx$.

2. Use geometry to evaluate the integral $\int_0^4 |x-2|\,dx$.

3. Evaluate the integral $\int e^x \sqrt{2e^x - 5}\, dx$.

BONUS. (5 points) Evaluate the integral $\int \frac{\sin x \cos x}{1 + \sin^4 x}\, dx$.