Math 75B Practice Midterm II
Ch. 18-20 (Ebersole), §§4.10-5.5 (Stewart)

DISCLAIMER. This collection of practice problems is *not* guaranteed to be identical, in length or content, to the actual exam. You may expect to see problems on the test that are not exactly like problems you have seen before.

On the actual exam you will have more room to work the problems. You will see directions similar to these:

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,* except *on questions or parts of questions designated as* ***True or False****,* ***Multiple Choice****,* ***Fill-In****, or* ***Graph****.*
3. **No calculators or notes are allowed on this exam.**
4. You have 50 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. Don't stress! I'm rooting for you!

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

1. If the velocity of an object at time t is $v(t) = 4t^2 + 1$ ft./s, then its distance in feet at time t is $s(t) = \frac{4}{3}t^3 + t$. **T** **F**

2. The function $F(x) = \sin 2x + 52$ is an antiderivative of the function $f(x) = 2\cos 2x$. **T** **F**

3. The function $G(x) = 4x^3$ is an antiderivative of the function $g(x) = x^4 - 2$. **T** **F**

4. $-1 + 0 + \frac{1}{3} + \frac{1}{2} + \frac{3}{5} + \frac{2}{3} = \sum_{i=-1}^{5} \frac{i}{i+2}$. **T** **F**

5. $\sum_{i=2}^{4} \frac{i^2}{2} = \frac{29}{2}$. **T** **F**

6. If $g(x)$ is an odd function which is continuous on the interval $[-3, 3]$, then $\int_{-3}^{3} g(x)\, dx = 0$. **T** **F**

7. If $h(x)$ is an even function which is continuous on the interval $[-3, 3]$, then $\int_{-3}^{3} h(x)\, dx = 2\int_{0}^{3} h(x)\, dx$. **T** **F**

Multiple Choice. *Circle the letter of the best answer.*

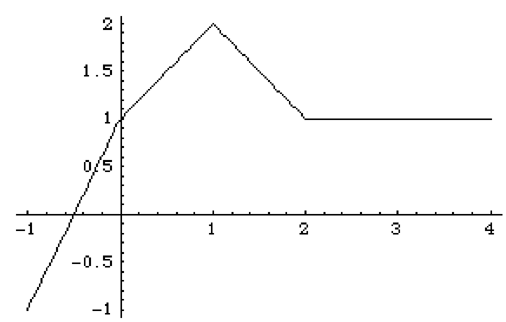
1. $\int_{-2}^{2} \sqrt{4 - x^2}\, dx =$

   (a) $-\frac{1}{6}$
   (b) 0
   (c) 2π
   (d) does not exist.

2. $\int_{0}^{\pi/4} \sec x \tan x\, dx =$

   (a) $\sqrt{2} - 1$
   (b) $\sqrt{2}$
   (c) $1 - \frac{\sqrt{2}}{2}$
   (d) does not exist.

For #3-4, use the graph of $f(x)$ shown below to answer the questions.



3. $\int_{-1}^{0} f(x)\, dx =$

   (a) -1
   (b) 0
   (c) 1
   (d) 2

4. $\int_{2}^{1} f(x)\, dx =$

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

5. $\displaystyle\int_0^{\pi} \cos\left(5\theta - \frac{\pi}{2}\right)\, d\theta =$

(a) $\frac{2}{5}$

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

(c) $\frac{\pi}{2}$

(d) $-\frac{\pi}{2}$

Fill-In. *If there is no answer to a question, write "NONE" or "D.N.E.".*

1. $\displaystyle\int (\sqrt[3]{x} - \sec^2 x)\, dx =$ _______________ .

2. $\displaystyle\int_{-1}^{2} \sqrt[4]{x}\, dx =$ _______________ .

3. $\displaystyle\int_{-1}^{2} \sqrt[3]{x}\, dx =$ _______________ .

4. If $F(x) = \displaystyle\int_5^x \sqrt{5t - t^4}\, dt$, then $F'(x) =$ _______________ .

5. If $G(x) = \displaystyle\int_x^{\sqrt{\pi}} \cot(6t^2)\, dt$, then $G'(x) =$ _______________ .

6. If the interval $[-4, 7]$ is divided into 6 equal subintervals, then the width of each subinterval is __________ .

7. $\displaystyle\int_{-2}^{1} |x|\, dx =$ _______________ .

Work and Answer. *You must show all relevant work to receive full credit.*

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

2. Evaluate $\displaystyle\int x^2(5-x^3)^{20}\,dx$.

3. (a) <u>Estimate</u> $\displaystyle\int_0^{\pi/2} \sin 2\theta\,d\theta$ using 3 rectangles and midpoints.

   (b) Evaluate $\displaystyle\int_0^{\pi/2} \sin 2\theta\,d\theta$ exactly.

   (c) What is the error of the estimate you made in part (a)?

4. If $F(x) = \displaystyle\int_5^{\sin^2 x} (3t - 5)\, dt$,

(a) Evaluate $F(x)$.

(b) Evaluate $F'(x)$.

(c) Show that the derivative of the function you obtained in (a) equals the function you obtained in (b).

5. Evaluate $\displaystyle\int_0^{\pi/3} x^2 - \sin x \, dx$.

6. Evaluate $\displaystyle\int_1^2 x(3x^2 - 1)^4 \, dx$.

Some kind of **BONUS.**