

For the upcoming midterm, you'll need:

- 1) a blue book;
- 2) a stapler;
- 3) remember your TA's name and section time;
- 4) a picture ID.

The following instruction will be on the real midterm:

Books, notes are **NOT** allowed. No calculators are allowed. **READ** the problems carefully. Put final answers in the boxes on this page. Put high quality work in the blue book for all answers. At the end of exam **STAPLE** this page to the **INSIDE** front blue cover of the blue book, so that the front side faces the white writing pages of the blue book; staple only once at the upper left corner (one bonus point for doing this the correct way).

The following will appear before the instruction on the real midterm:

Print Your Perm Number \_\_\_\_\_ Name \_\_\_\_\_

Circle your TA's name and Discussion time:

Ryan Blair R 8am ; 5pm; 6pm; 7pm

Robert Sulway T 8am; 5pm; 6pm; 7pm;

### 3B Practice Midterm #2 W 2010

Feb. 2010 Instructor: Prof. Dai

1. Find the volume of the solid obtained by rotating the region under  $y = \sin(x^2)$  from  $x = 0$  to  $x = \sqrt{\pi}$  about the  $y$ -axis.

2. Find the average value of the following functions on the given interval.

(a)  $f(x) = \cos^4 x \sin^3 x$ ,  $[0, \pi]$ .

(b)  $g(r) = r^4 \ln r$ ,  $[1, 3]$ .

3. Evaluate the following integrals.

(a)  $\int (\ln x)^2 dx$ .

(b)  $\int \tan^{-1} x dx$ .

(c)  $\int e^{2t} \sin(3t) dt$ .

(d)  $\int \frac{x^3}{x^2 - 2x - 8} dx$ .

4. A tank full of water has the shape obtained by rotating  $y = x^2$ ,  $0 \leq x \leq 2$  around the  $y$ -axis. Find the work required to pump the water out of the tank.

5. Evaluate the following integrals.

(a)  $\int_0^2 \frac{2x+1}{x^2+x-2} dx$ .

(b)  $\int_0^\infty t e^{-2t} dt$ .

6. A bucket that weighs 4 lb and a rope of negligible weight are used to draw water from a well of 80 ft deep. The bucket is filled with 40 lb of water and is pulled up at a rate of 2 ft/s, but water leaks out of a hole in the bucket at a rate of 0.1 lb/s. Find the work done in pulling the bucket to the top of the well.