

**MATH 152, Spring 2009
COMMON EXAM I - VERSION B**

LAST NAME, First name (print): _____

INSTRUCTOR: _____

SECTION NUMBER: _____

UIN: _____

SEAT NUMBER: _____

DIRECTIONS:

1. The use of a calculator, laptop or computer is prohibited.
2. In Part 1 (Problems 1-10), mark the correct choice on your ScanTron using a No. 2 pencil. *For your own records, also record your choices on your exam!*
3. In Part 2 (Problems 11-15), present your solutions in the space provided. *Show all your work* neatly and concisely and *clearly indicate your final answer*. You will be graded not merely on the final answer, but also on the quality and correctness of the work leading up to it.
4. Be sure to *write your name, section number and version letter of the exam on the ScanTron form*.

THE AGGIE CODE OF HONOR

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

Signature: _____

DO NOT WRITE BELOW!

Question	Points Awarded	Points
1-10		40
11		12
12		12
13		12
14		12
15		12
		100

PART I: Multiple Choice

1. (4 pts) Find the area of the region bounded by $y = x^2$ and $y = 8 - x^2$.

- (a) $\frac{22}{3}$
- (b) $\frac{44}{3}$
- (c) $\frac{32}{3}$
- (d) $\frac{64}{3}$
- (e) $\frac{128}{3}$

2. (4 pts) $\int_0^{\pi/4} \tan^4 x \sec^4 x \, dx$

- (a) $\frac{12}{35}$
- (b) $\frac{1}{5}$
- (c) $-\frac{2}{35}$
- (d) $\frac{5}{12}$
- (e) $\frac{2}{35}$

3. (4 pts) Find the average value of $f(x) = x \sin(x^2)$ from $x = 0$ to $x = \sqrt{\pi}$.

- (a) -1
- (b) 1
- (c) $\frac{1}{\sqrt{\pi}}$
- (d) $-\frac{1}{\sqrt{\pi}}$
- (e) 0

4. (4 pts) Find the positive value of b so that the average value of $f(x) = 3x^2 - 2x$ over the interval $[0, b]$ is equal to 2.

- (a) $b = 2$
- (b) $b = 1$
- (c) $b = \frac{3}{4}$
- (d) $b = \frac{4}{3}$
- (e) Not enough information.

5. (4 pts) Find the volume of the solid obtained by revolving the region bounded by $y = \frac{1}{x}$, $y = 0$, $x = 1$ and $x = 5$ about the y -axis.

(a) 23π

(b) $\frac{4\pi}{5}$

(c) $2\pi \ln 5$

(d) $\frac{2\pi}{5}$

(e) 8π

6. (4 pts) $\int_1^2 x^3 \ln x \, dx =$

(a) $4 \ln 2 + \frac{15}{16}$

(b) $4 \ln 2 + \frac{3}{4}$

(c) $4 \ln 2$

(d) $4 \ln 2 - \frac{3}{4}$

(e) $4 \ln 2 - \frac{15}{16}$

7. (4 pts) $\int_0^1 x \sin(\pi x) dx =$

(a) $-\frac{1}{\pi}$

(b) $-\pi$

(c) $\frac{1}{\pi}$

(d) 0

(e) π

8. (4 pts) $\int \cos^2(2x) dx =$

(a) $\frac{1}{2}x - \frac{1}{4}\sin(2x) + C$

(b) $\frac{1}{2}x + \frac{1}{4}\sin(2x) + C$

(c) $\frac{1}{2}x + \frac{1}{8}\sin(4x) + C$

(d) $\frac{1}{2}x - \frac{1}{8}\sin(4x) + C$

(e) $\frac{\sin^3(2x)}{3} + C$

9. (4 pts) A 50 foot rope that weighs 25 pounds hangs from the top of a tall building. How much work is required to pull 10 feet of the rope to the top?

- (a) 900 foot pounds
- (b) 25 foot pounds
- (c) 100 foot pounds
- (d) 120 foot pounds
- (e) 225 foot pounds

10. (4 pts) The region bounded by $y = x^2$ and $y = 2x$ is revolved about the y -axis. Find the volume.

- (a) $\frac{8\pi}{15}$
- (b) $\frac{4\pi}{3}$
- (c) $\frac{64\pi}{15}$
- (d) $\frac{8\pi}{3}$
- (e) $\frac{2\pi}{3}$

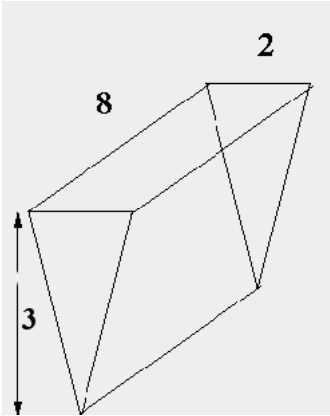
PART II WORK OUT

Directions: Present your solutions in the space provided. *Show all your work* neatly and concisely and *Box your final answer*. You will be graded not merely on the final answer, but also on the quality and correctness of the work leading up to it.

11. (12 pts) Find the volume of the solid obtained by rotating the region bounded by $y = x^2 + 1$ and $y = 2$ about the line $y = 3$.

12. (12 pts) Find $\int \frac{dx}{x^2\sqrt{9-x^2}}$

13. (12 pts) A tank is full of water and has the shape of a triangular trough 8 meters long, 3 meters tall and 2 meters wide (see figure). Find the work needed to pump all the water to the top of the tank. Note: The weight density of water is 9800 Newton's per cubic meter.

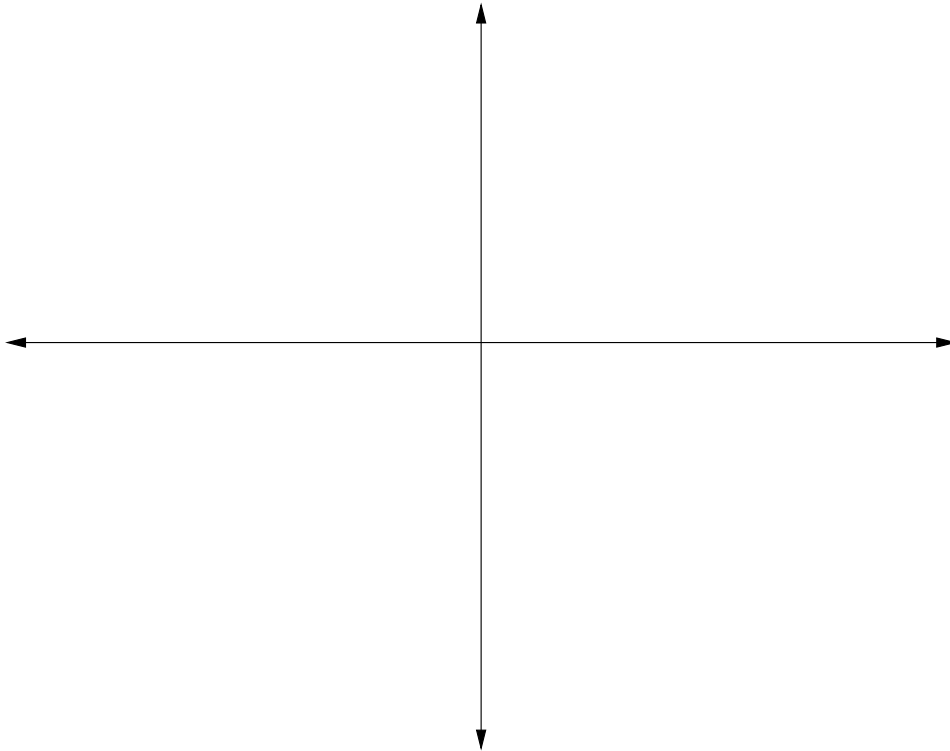


14. (12 pts) Find the volume of the solid described here: The base of the solid is a triangle with vertices $(0, 0)$, $(1, 0)$ and $(0, 2)$. Cross sections perpendicular to the x -axis are squares.

Exam continues on next page

15. (12 pts total) Consider the region bounded by $y = \sin x$, $y = \cos x$, $x = 0$ and $x = \pi$.

(i) (4 pts) Shade the bounded region on the axes provided below. Be sure to clearly label all pertinent points.



(ii) (8 pts) Find the area of this bounded region.

End of Exam