MATH 152, Spring 2010
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		10
13		10
14		12
15		16
		100

PART I: Multiple Choice

1. (4 pts) Let $f(x) = \dfrac{1}{\sqrt{x}}$. Find the value of c such that $f(c) = f_{ave}$, the average value of $f(x)$ over the interval $[4, 9]$.

   (a) $\dfrac{4}{25}$
   (b) $\dfrac{25}{2}$
   (c) $\dfrac{13}{2}$
   (d) $\dfrac{25}{4}$
   (e) $\dfrac{2}{5}$

2. (4 pts) Find the area of the region bounded by $y = \cos x$, $y = -1$, $x = 0$ and $x = \dfrac{\pi}{2}$.

   (a) $\dfrac{\pi}{2} + 2$
   (b) $-1 + \dfrac{\pi}{2}$
   (c) $1 + \dfrac{\pi}{2}$
   (d) π
   (e) $\dfrac{\pi}{2}$

3. (4 pts) Find the area bounded by $f(x) = 2x - 6$, the x-axis, $x = 0$ and $x = 4$.

   (a) 0
   (b) 10
   (c) -8
   (d) 15
   (e) 2

4. (4 pts) Let R be the region bounded by $y = x^2$ and $y = 1$. Find the volume of the solid obtained by rotating R about the line $y = 1$.

   (a) $\dfrac{\pi}{5}$
   (b) $\dfrac{\pi}{6}$
   (c) $\dfrac{2\pi}{5}$
   (d) $\dfrac{8\pi}{15}$
   (e) $\dfrac{16\pi}{15}$

5. (4 pts) A uniform cable hanging over the edge of a building is 80 feet long and weighs 240 pounds. How much work is required to pull 10 feet of the cable to the top?

   (a) 2250 foot-pounds
   (b) 150 foot-pounds
   (c) 360 foot-pounds
   (d) 11550 foot-pounds
   (e) 850 foot-pounds

6. (4 pts) $\displaystyle\int \frac{\sec\theta\tan\theta}{4+\sec\theta}\,d\theta =$

   (a) $\dfrac{1}{4}\ln|\cos\theta| + C$
   (b) $\dfrac{\sec\theta}{4\theta + \ln|\sec\theta + \tan\theta|} + C$
   (c) $\ln|4+\sec\theta| + C$
   (d) $\ln|4+\tan\theta| + C$
   (e) $\dfrac{1}{4}\ln|\sec\theta| + C$

7. (4 pts) $\displaystyle\int_0^{\pi} x\cos\left(\frac{x}{2}\right)\,dx =$

   (a) $4 - 2\pi$
   (b) $2\pi - 4$
   (c) $2\pi + 4$
   (d) $\dfrac{\pi}{2} - \dfrac{1}{4}$
   (e) $\pi - 1$

8. (4 pts) The region bounded by $y = x - x^2$ and the x-axis is revolved around the y-axis. Find the volume.

(a) $\frac{\pi}{3}$

(b) $\frac{\pi}{30}$

(c) $\frac{\pi}{15}$

(d) $\frac{\pi}{12}$

(e) $\frac{\pi}{6}$

9. (4 pts) $\int \left(\cos^3 x\right)\left(\sqrt{\sin x}\right)\, dx =$

(a) $\frac{2}{3}(\cos x)^4(\sin x)^{-1/2} + C$

(b) $\frac{2}{3}(\sin x)^{3/2} - \frac{2}{7}(\sin x)^{7/2} + C$

(c) $-\frac{2}{3}(\cos x)^4(\sin x)^{-1/2} + C$

(d) $\frac{2}{7}(\sin x)^{7/2} + \frac{2}{3}(\sin x)^{3/2} + C$

(e) $\frac{2}{7}(\sin x)^{7/2} - \frac{2}{3}(\sin x)^{3/2} + C$

10. (4 pts) Find the average value of $f(x) = \frac{x}{(x+1)^2}$ on the interval $[0, 2]$.

(a) $\frac{1}{2}\ln 3 + \frac{2}{3}$

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

(c) $\ln 3 - \frac{2}{3}$

(d) $\frac{1}{2}\ln 3 - \frac{1}{3}$

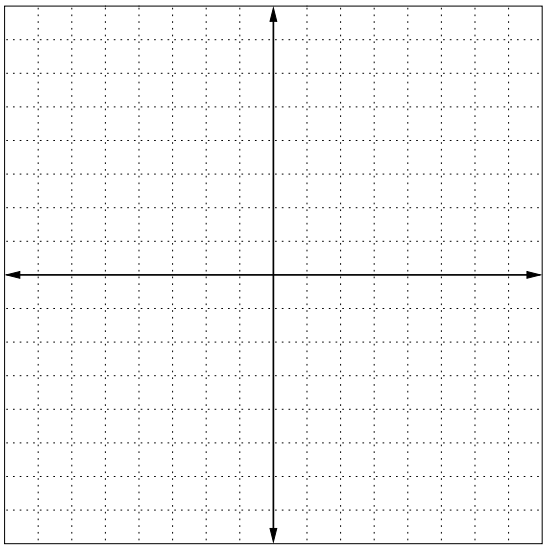
(e) None of the above.

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 $y = \cos x$, $y = \sin x$, $x = 0$ and $x = \dfrac{\pi}{4}$ about the x-axis.

12. (10 pts) Sketch the region bounded by $y = x^2$, $y = x + 2$, $x = -2$ and $x = 2$. Clearly label all intersection points. Find the area of this region.



13. (10 pts) Find the volume of the solid described here: The base of the solid is the ellipse $x^2 + \frac{y^2}{4} = 1$. Cross sections perpendicular to the x-axis are squares.

14. (12 pts) A tank in the shape of a hemisphere with radius 2 meters is full of water with weight density $\rho g = 9800$ Newtons per cubic meter. Find the work done in pumping all the water to the top of the tank.

15. Integrate:

a.) (8 pts) $\int \left(\tan^3 x\right)\left(\sec^5 x\right)\, dx$

b.) (8 pts) $\int x^3 e^{x^2}\, dx$