MATH 152, SPRING 2006
COMMON EXAM I - VERSION A

NAME (print): _____

INSTRUCTOR: _____

SECTION NUMBER: _____

UIN: _____

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 form No. 815-E using a No. 2 pencil. *For your own records, also record your choices on your exam!* ScanTrons will be collected from all examinees after 90 minutes and will not be returned.
3. In Part 2 (Problems 11-14), 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		50
11		8
12		24
13		9
14		9
		100

PART I

1. (5 pts) Find the average value of $f(x) = x\sqrt{x^2 - 1}$ on the interval $1 \leq x \leq 4$.

   (a) $\sqrt{15}$

   (b) $5\sqrt{15}$

   (c) $\dfrac{5\sqrt{15}}{3}$

   (d) $2\sqrt{15}$

   (e) $3\sqrt{15}$

2. (5 pts) Compute $\displaystyle\int_0^1 xe^{-2x}\,dx$.

   (a) $1 - 3e^{-2}$

   (b) $\dfrac{3 - e^{-2}}{2}$

   (c) $\dfrac{3 + e^{-2}}{2}$

   (d) $\dfrac{1 - 3e^{-2}}{4}$

   (e) $\dfrac{1 + 3e^{-2}}{4}$

Exam continues on next page

3. (5 pts) Compute $\int_0^5 \sqrt{25 - x^2}\, dx$.

(a) π

(b) $\dfrac{25\pi}{4}$

(c) 5π

(d) 2π

(e) $\dfrac{25\pi}{8}$

4. (5 pts) Calculate $\displaystyle\int \frac{1}{x(x^2-1)}\, dx$, assuming that $x > 1$.

(a) $\ln(\tan^{-1}(x^2+1)) + C$

(b) $\ln\left(\dfrac{1}{x(x^2-1)}\right) + C$

(c) $\ln\left(\dfrac{\sqrt{x^2+1}}{x}\right) + C$

(d) $\ln\left(\dfrac{\sqrt{x^2-1}}{x}\right) + C$

(e) $\ln(x(x^2-1)) + C$

Exam continues on next page

5. (5 pts) If $x = \sin^{-1}\dfrac{t}{2}$, then $\sec x =$

(a) $\dfrac{2}{\sqrt{4-t^2}}$

(b) $\dfrac{\sqrt{4-t^2}}{t}$

(c) $\dfrac{\sqrt{4-t^2}}{2}$

(d) $\dfrac{2}{t}$

(e) $\dfrac{t}{\sqrt{4-t^2}}$

6. (5 pts) Which of the following integrals represents the area of the region bounded by the graphs of $y = x^2$ and $y = \sqrt{x}$?

(a) $\displaystyle\int_0^1 (x^2 - \sqrt{x})\,dx$

(b) $\displaystyle\int_0^1 (\sqrt{x} - x^2)\,dx$

(c) $\displaystyle\int_0^1 (y^2 - \sqrt{y})\,dy$

(d) $\pi\displaystyle\int_0^1 (x - x^4)\,dx$

(e) $\displaystyle\int_0^2 (\sqrt{y} - y^2)\,dy$

Exam continues on next page

7. (5 pts) The base of a solid is the semicircle $0 \leq y \leq \sqrt{9-x^2}$ and the cross sections perpendicular to the x-axis are squares. Find its volume.

(a) $\dfrac{9\pi}{2}$

(b) $\dfrac{9\pi}{4}$

(c) 12

(d) 18

(e) 36

8. (5 pts) Compute $\displaystyle\int_1^e \ln(2x)\,dx$.

(a) $e\ln(2) - \ln(2) + e$

(b) $e\ln(2) + \ln(2) - e$

(c) $e\ln(2) - \ln(2) + 1$

(d) $e\ln(2) - \ln(2) - 1$

(e) $-e\ln(2) + \ln(2) + 1$

Exam continues on next page

9. (5 pts) Compute $\int_0^{\pi/2} \sin^3(2x)\,dx$.

(a) $\frac{2}{3}$

(b) 1

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

(d) 2

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

10. (5 pts) A spring has a natural length of 1 meter and a force of 12 N is required to hold it stretched to a total length of 3 meters. How much work is done in stretching this spring from its natural length to a total length of 5 meters?

(a) 32 J.

(b) 48 J.

(c) 50 J.

(d) 72 J.

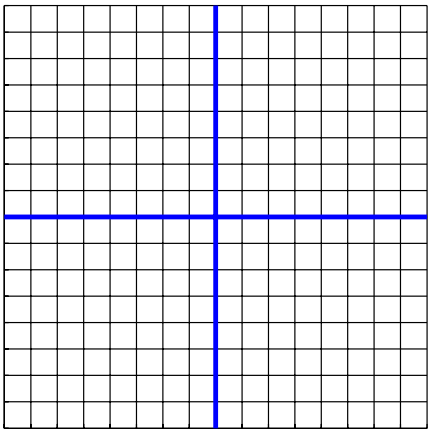
(e) 75 J.

Exam continues on next page

PART II

11. Find the area of the region bounded by the line $2y = x$ and the parabola $y^2 = 8 - x$.

(a) (2 pts) Graph the region.



(b) (3 pts) Set-up the integral.

(c) (3 pts) Evaluate the integral.

Exam continues on next page

12. Find the following indefinite integrals:

(a) (8 pts) $\displaystyle\int \frac{1}{\sqrt{9x^2-4}}\,dx$

(b) (8 pts) $\displaystyle\int \frac{x^4}{\sqrt{1-x^{10}}}\,dx$

Problem continues on next page

(c) (8 pts) $\int x \tan^{-1} x \, dx$

Exam continues on next page

13. (9 pts) Consider the region in the first quadrant bounded by the curves $y = x^2$ and $y = 2x$. Use the method of *washers* to compute the volume of the solid obtained by revolving this region about the x-axis.

Exam continues on next page

14. (9 pts) Consider the region in the first quadrant bounded by the curves $y^2 = x$ and $y = x^3$. Use the method of *cylindrical shells* to compute the volume of the solid obtained by revolving this region about the x-axis.

End of exam