

**MATH 152, FALL 2010
COMMON EXAM I - VERSION A**

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, as Scantrons will NOT be returned!*
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 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: _____

1. Compute $\int x^2 e^x dx$.

- (a) $\frac{1}{3}x^3 e^x + C$
- (b) $2xe^x + x^2 e^x + C$
- (c) $x^2 e^x + 2xe^x - 2e^x + C$
- (d) $2xe^x - 4e^x + C$
- (e) $x^2 e^x - 2xe^x + 2e^x + C$

2. A rope 20 feet long weighing 2 pounds per foot supports a 160-lb weight on the side of the building. How much work (in ft-lbs) is required to pull the weight to the top of the building?

- (a) 3200
- (b) 1200
- (c) 4000
- (d) 800
- (e) 3600

3. Compute $\int_0^1 \frac{x}{\sqrt{x^2 + 1}} dx$

- (a) $\sqrt{5} - \sqrt{2}$
- (b) $\sqrt{2} - 1$
- (c) $4\sqrt{2} - 4$
- (d) $\frac{\sqrt{2}}{2}$
- (e) $\frac{4\sqrt{2}}{3} - \frac{2}{3}$

4. Compute $\int_0^{\pi/2} \sin(2x) \cos(x) dx$

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

(b) 0

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

(d) $\frac{1}{2}$

(e) 1

5. The base of a solid is the parabolic region between the graphs of $y = 1$ and $y = x^2$. Cross-sections perpendicular to the y -axis are squares. Find the volume of the solid.

(a) $\frac{8}{15}$

(b) $\frac{1}{2}$

(c) $\frac{16}{9}$

(d) 2

(e) $\frac{1}{6}$

6. After an appropriate substitution, the integral $\int_{-1}^6 \frac{x}{\sqrt{10+x}} dx$ is equivalent to which of the following?

(a) $\int_3^4 (10u^{-1} - u) du$

(b) $\int_9^{16} (u^{1/2} - 10u^{-1/2}) du$

(c) $\int_9^{16} (10u^{-1/2} - u^{1/2}) du$

(d) $\int_{-1}^6 x u^{-1/2} du$

(e) $\int_3^4 (u - 10u^{-1}) du$

7. Which integral computes the area between the curves $y = x - 1$ and $x + 1 = y^2$?

(a) $\int_{-1}^2 \left((y + 1) - (y^2 - 1) \right) dy$

(b) $\int_{-1}^3 \left((x + 1) - (x - 1) \right) dx$

(c) $\int_0^3 \left((x - 1) - \sqrt{x + 1} \right) dx$

(d) $\int_{-1}^2 \left((y^2 - 1) - (y + 1) \right) dy$

(e) $\int_{-1}^3 \left(\sqrt{x + 1} - (x - 1) \right) dx$

8. Which integral gives the volume of the solid formed by rotating the region bounded by $y = x$ and $y = x^2$ about the line $x = 2$?

(a) $2\pi \int_0^1 (2 - x)(x - x^2) dx$

(b) $2\pi \int_0^1 (2 - y)(y - \sqrt{y}) dy$

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

(d) $2\pi \int_0^1 (x - 2)(x - x^2) dx$

(e) $\pi \int_0^1 \left((2 - x)^2 - (2 - x^2)^2 \right) dx$

9. Which of the following is equivalent to $\int x^3 \ln x \, dx$?

(a) $\frac{1}{4}x^3 - \int \frac{1}{4}x^4 \ln x \, dx$

(b) $\frac{1}{4}x^4 \ln x - \int \frac{1}{4}x^3 \, dx$

(c) $x^2 - \int 3x \, dx$

(d) $x^4 \ln x + x^4 - \int (3x^3 \ln x + 3x^3) \, dx$

(e) $3x^2 \ln x - \int 3x \, dx$

10. Compute $\int_0^{\pi/4} \sec^4 x \, dx$.

(a) $\frac{4\sqrt{2}}{5}$

(b) $\frac{32}{5}$

(c) $\frac{2\sqrt{2}-1}{3}$

(d) $\frac{4}{3}$

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

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.

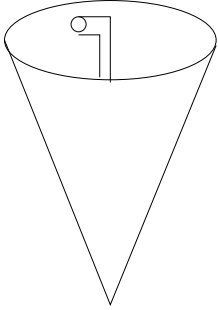
11. (12 points) Sketch the graph and find the area of the region bounded by the curve $y = \frac{1}{4}x^2$, the line tangent to this curve at $x = 8$, and the x -axis.

12. (8 points each) Compute the following integrals:

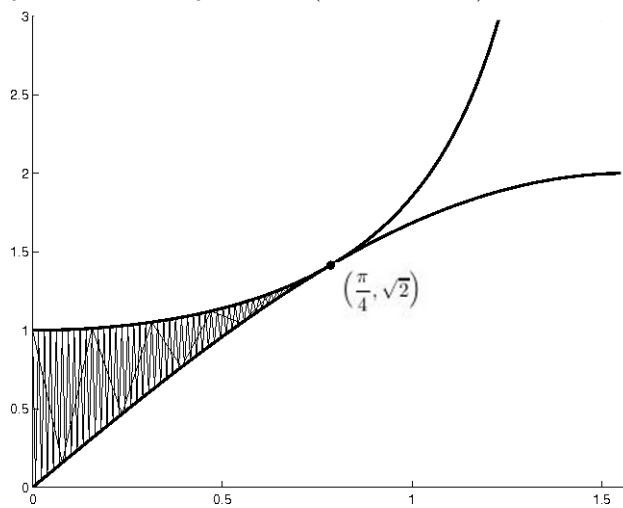
(a) $\int x \tan^{-1} x \, dx$

(b) $\int \cos^2 x \tan^3 x \, dx$

13. (12 points) The conical tank shown below is 3 feet tall (not including the spout), has a 2 foot radius at the top, is full of water (density = ρg), and has a 1 foot tall spout. Find the work required to pump all the water out of the spout. (Leave your answer in terms of ρ and g .)



14. (10 points) Find the volume of the solid formed by rotating the region bounded by $x = 0$, $y = 2 \sin x$ and $y = \sec x$ (shaded below) about the x -axis.



15. (10 points) Find the number(s) b such that the average value of $f(x) = 3x^2 + 4x - 7$ on the interval $[0, b]$ is equal to 8.

DO NOT WRITE BELOW!

Question	Points Awarded	Points
1-10		40
11		12
12		16
13		12
14		10
15		10
TOTAL		100