Instructor: Ann Clifton   Name: _____

Do not turn this page until told to do so. You will have a total of 1 hour 25 minutes to complete the exam. Unless otherwise stated, you **must** show all work to receive full credit. Unsupported or otherwise mysterious answers will **not receive credit.** If you require extra space, use the provided scrap paper and indicate that you have done so.

You may use a calculator **without a CAS** if you like, but a calculator is not necessary. NO PHONES ALLOWED.

Draw a flower on this page if you read these directions in full. Cheating of any kind on the exam will not be tolerated and will result in a grade of 0%.

#	score	out of	#	score	out of
1		3	9		5
2		4	10		6
3		3	11		20
4		3	12		16
5		3	13		15
6		4	14		10
7		4	EC		3
8		4	Total		100

Remember: This exam has no impact on your worth as a human being. You got this!!!
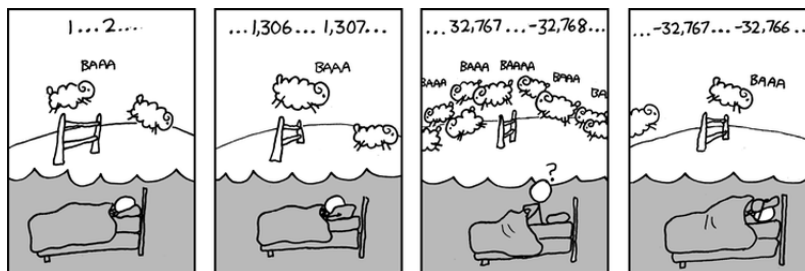
Fill in the blanks.

1. (3 points) If $f(x)$ is a continuous function on the interval $[a, b]$ and $F(x)$ is any antiderivative of $f(x)$, then

$$\int_a^b f(x)dx = \underline{\hspace{4cm}}$$

2. (4 points) Assume that $\int f(x)dx$ and $\int g(x)dx$ exist.

(a) $\int f(x) \pm g(x)dx = \underline{\hspace{4cm}}$

(b) Let a be a number, $\int af(x)dx = \underline{\hspace{4cm}}$

3. (3 points) Let $n \neq -1$ be a fixed number,

$$\int x^n dx = \underline{\hspace{4cm}}$$

4. (3 points)

$$\int e^x dx = \underline{\hspace{4cm}}$$

5. (3 points)

$$\int \frac{1}{x}dx = \underline{\hspace{4cm}}$$

2

Multiple Choice. Choose the best answer. (4 points each.)

6. Find the antiderivative $F(x)$ of the function $f(x) = 3x^2 + e^x$ which satisfies $F(0) = 2$.

    A. $F(x) = x^3 + e^x + 2$ **B.** $F(x) = x^3 + e^x + 1$

    C. $F(x) = x^3 + e^x + c$ **D.** $F(x) = x^3 + e^x + 3$

7. Find the indefinite integral $\int \left(\frac{3}{x} + \frac{1}{\sqrt{x}} \right) dx$.

    A. $2\sqrt{x} + c$ **B.** $3 \ln x + \frac{2}{\sqrt{x}} + c$

    C. $3 \ln |x| + 2\sqrt{x} + c$ **D.** $3 \ln |x| + \frac{2}{\sqrt{x}} + c$

8. Find the definite integral $\int_2^7 \left(\frac{1}{x} - \frac{2}{x^3} \right) dx$. Round your answer to three decimal places.

    A. 1.023 **B.** 0.334

    C. -1.023 **D.** 1.482

Short Answer.

9. (5 points) Explain in words what the definite integral of a function represents and how we *estimate* it.

10. (6 points) Approximate the area under the curve $y = x^2$ on the interval $[0, 4]$ using $n = 4$ right-endpoint subintervals.

11. (20 points) Compute the following indefinite integrals.

(a) $\int 7dx$

(b) $\int (10x + 2)dx$

(c) $\int (36x^2 + 26x)dx$

(d) $\int x^2 dx$

(e) $\int \frac{1}{\sqrt{x}}dx$

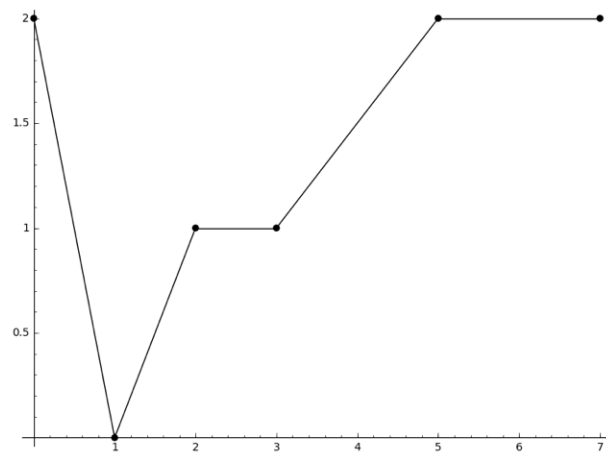12. (16 points) Compute the following indefinite integrals.

(a) $\int 25(x+7)^{24}dx$

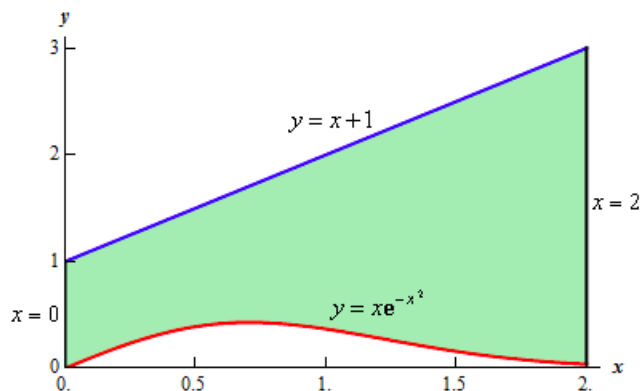(b) $\int (x+2)e^{\frac{1}{2}x^2+2x+1}dx$

(c) $\int \frac{4x}{2x^2+7}dx$

(d) $\int \frac{x}{\sqrt{x^2+1}}dx$

13. (15 points) Consider the function f given by the graph:

Compute $\displaystyle\int_0^7 f(x)\,dx$.

14. (10 points) Find the area of the region bounded by $y = xe^{-x^2}$ and $y = x + 1$ on the interval $[0, 2]$. *Set up but do **not** evaluate the integral.* The graph of the region is given below for reference.

15. (Extra Credit. 3 points) Evaluate the integral from number 14 (the problem above). Round your answer to four decimal places.