> *I pledge that I have neither given nor received unauthorized assistance during this examination.*
>
> **Signature:**

- **DON'T PANIC!** If you get stuck, take a deep breath and go on to the next question.

- Unless the problem says otherwise **you must show your work** sufficiently much that it's clear to me how you arrived at your answer.

- You may use a scientific calculator, but not a graphing calculator or phone.

- It is okay to leave a numerical answer like $\frac{39}{2} - (18 - e^2)$ unsimplified.

- You may bring a two-sided sheet of notes on letter-sized paper in your own handwriting.

- There are 7 problems on 6 pages.

Question	Points	Score
1	9	
2	8	
3	6	
4	6	
5	6	
6	8	
7	8	
Total:	51	

Good luck!

[9 points]   1. Find the following antiderivatives:

(a) $\displaystyle\int \frac{x}{\sqrt{4x^2 + 3}}\, dx$

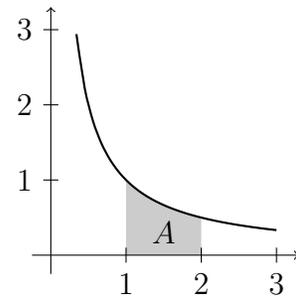(b) $\displaystyle\int \frac{3x^2 + 6x + 1}{x}\, dx$

(c) $\displaystyle\int e^{2x}\sqrt{e^{2x} + 2}\, dx$

[8 points]   2.   (a) On the axes below, sketch the curves $y = x^2$ and $y = 2 - x$ on the interval $[0, 2]$.
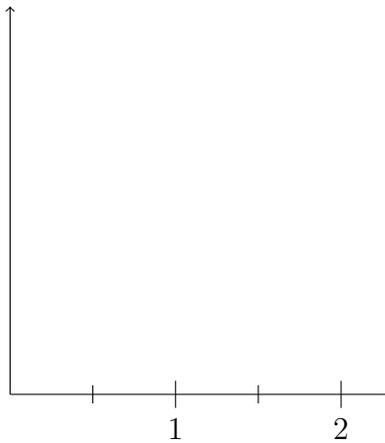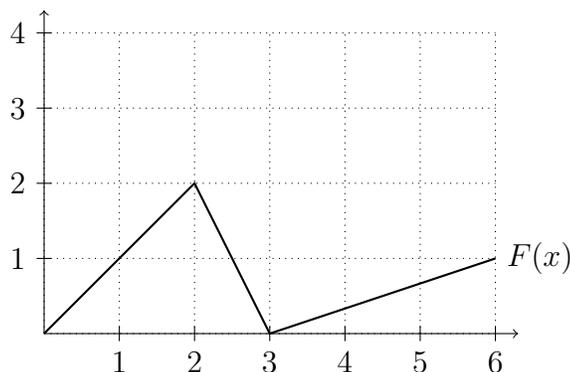

    (b) Compute the area of the region bounded by the curves $y = x^2$, $y = 2 - x$, and the x-axis.

[6 points]   3.   Let A be the region underneath the function $f(x) = \frac{1}{x}$ from $x = 1$ to $x = 2$. Find the volume of the solid obtained by rotating A around the x-axis.

[6 points]   4. Let $F(x) = \int_0^x f(t)\, dt$. Here is a picture of the graph of $F(x)$:

Be careful! This is a picture of $F(x)$, not a picture of $f(x)$.

Are the following statements true or false?

(a) $f(1) > 0$

    ○ True   ○ False   ○ Not enough info

(b) $F(1) > 0$

    ○ True   ○ False   ○ Not enough info

(c) $f(4) > 0$

    ○ True   ○ False   ○ Not enough info

(d) $f(x) \geq 0$ for all choices of x

    ○ True   ○ False   ○ Not enough info

(e) The maximum value of $f(x)$ on the interval $[0, 6]$ is 2.

    ○ True   ○ False   ○ Not enough info

(f) The minimum value of $f(x)$ on the interval $[0, 6]$ is -2.

    ○ True   ○ False   ○ Not enough info

[6 points]   5. What is the average value of the function $\sin x$ on the interval from 0 to π?

[8 points]   6. Using integration, find the volume of a cone with height 2 whose base is a circle with radius 2.

[8 points]   7. Find the following definite integrals:

(a) $\displaystyle\int_{-4}^{4} |x|\, dx$

(b) $\displaystyle\int_{4}^{5} (2t - 8)^4\, dt$