

# Exam 1

Math 126: Calculus II

September 30, 2015

Name: \_\_\_\_\_

---

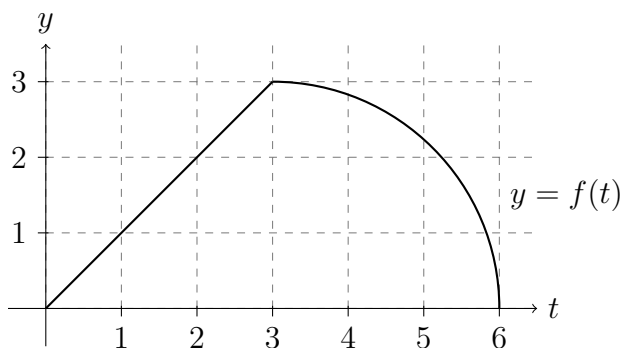
## Exam Rules:

1. *No calculators of any sort are permitted on this exam.*
2. *Justify your answer! A correct answer with no justification may receive no credit.*
3. *Clearly label your work.*

---

**This exam consists of 9 questions, worth a total of 100 points.**

1. (16 points) Let  $g(x) = \int_1^x f(t) dt$ , where  $f(t)$  is defined by the graph below. Note that the domain of  $g$  is  $[0, 6]$ .



(a) What is  $g(3)$ ?

(b) What is  $g'(3)$ ?

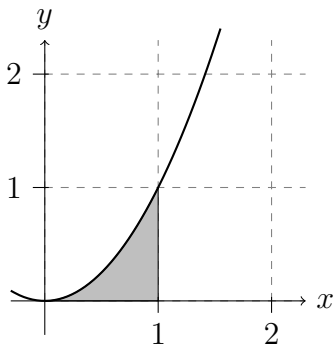
2. (10 points) Evaluate the integral:

$$\int_0^{\pi/2} \sin(x) \cos^7(x) dx$$

3. (10 points) Let  $g$  be a continuous function such that  $\int_1^{27} g(u) du = 12$ .

Find  $\int_1^3 x^2 g(x^3) dx$ .

4. (12 points) The region bounded by the graph of  $y = x^2$ ,  $y = 0$ , and  $x = 1$  is rotated around the line  $y = 1$ . Set up an integral that gives the volume of the resulting solid. (Just write the integral; you don't have to evaluate it.)



5. (10 points) If water flows into a tank at a rate of  $r(t)$  gallons per minute, what does  $\int_0^{60} r(t) dt$  represent?

6. (12 points) Find the area between the graphs of  $f(x) = x^2$  and  $g(x) = 4$ .

7. (10 points) Find the general antiderivative:

$$\int x e^{2x} dx$$

8. (10 points) If  $h(x) = \int_5^{\sqrt{x}} \frac{t}{t^2 - 1} dt$ , what is  $h'(x)$ ?

9. (10 points) What is the average value of the function  $f(x) = \sin(\pi x) + 2$  on the interval  $[0, 2]$ ?

**St. Olaf honor pledge:** I pledge my honor that on this examination I have neither given nor received assistance not explicitly approved by the professor and that I have seen no dishonest work.

Signed: \_\_\_\_\_

I have intentionally not signed the pledge. (Check the box if appropriate.)