Exam 1

Name: _____

Math 126: Calculus II

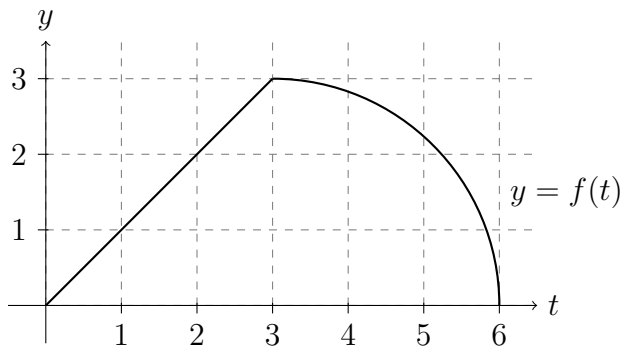
September 30, 2015

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 $g(3)$?

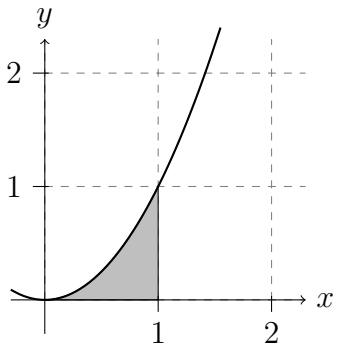
   (b) What is $g'(3)$?

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:

$$\int xe^{2x}\, dx$$

8. (10 points) If $h(x) = \displaystyle\int_5^{\sqrt{x}} \frac{t}{t^2 - 1}\, dt$, 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.)