Math 125 F - Winter 2016
Midterm Exam Number One
January 28, 2016

Name: _____   Student ID no. : _____

Signature: _____   Section: _____

1	12	
2	12	
3	10	
4	5	
5	12	
6	9	
Total	60	

- This exam consists of SIX problems on SIX pages, including this cover sheet.

- Show all work for full credit.

- You do not need to simplify your answers.

- If you use a trial-and-error or guess-and-check method when a more rigorous method is available, you will not receive full credit.

- If you run out of room, write on the back of the page, but *indicate that you have done so*!

- You may use one hand-written double-sided 8.5″ by 11″ page of notes.

- You may use a *scientific calculator*. Calculators with graphing, differentiation, integration, or algebraic capabilities are not allowed.

- You have 80 minutes to complete the exam.

1. **[4 points per part]** Compute the indefinite integrals.

(a) $\int \left(\sqrt[7]{x} - \dfrac{2}{\sqrt{1-x^2}} \right) dx$

(b) $\int \left(x^{1.7} + e^{3x} \right) dx$

(c) $\int \dfrac{\sin^2(\ln(x)) \cos(\ln(x))}{x} dx$

2. **[12 points]** Compute the area of the region bounded by the following three curves:

$$y = 1 \qquad y = 2\sqrt{x} \qquad y = \frac{54}{x}$$

3. **[10 points]** A remote-controlled tomato is moving along the number line. Its velocity after t seconds is given by the formula
$$v(t) = 9 - 3^t.$$

Compute the total distance traveled by the tomato from time $t = 0$ to $t = 4$.

(You do not need to simplify your answer.)

4. **[5 points]** Write (but do not simplify) a formula for the L_{1000} approximation of $\int_0^2 \sin(x)\, dx$.

(*Please* use Σ-notation. Do not write out a thousand summands.)

5. **[12 points]** Let R be the region in the x-y plane below $y = \sec(x)\tan(x)$ and above $y = -2$ from $x = 0$ to $x = \dfrac{\pi}{4}$.

(a) Write an integral to compute the volume of the solid formed by revolving R around the line $y = -2$.

(b) Evaluate the integral from part (a).

6. Below is the graph of $f(x)$, the most beautiful function you've ever seen.
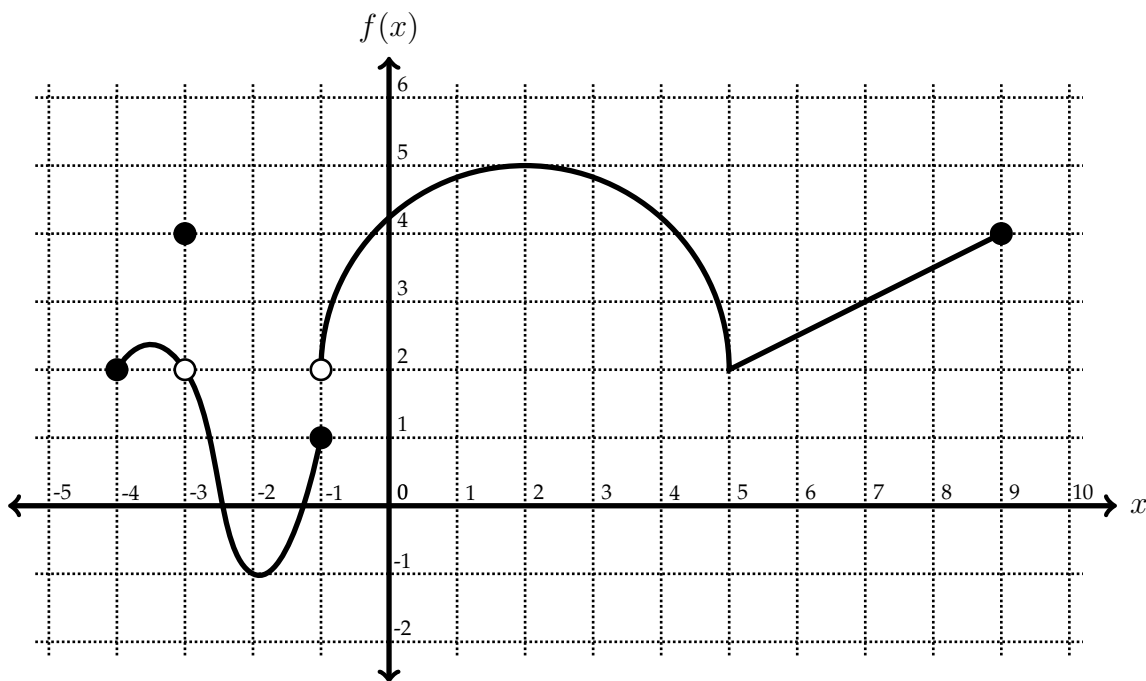
Use this graph to answer the following questions.

(a) **[3 points]** Does $\displaystyle\int_{-4}^{-1} f(x)\,dx$ exist? Explain, briefly.

(b) **[3 points]** Evaluate $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n} f\left(2 + \frac{5i}{n}\right)\frac{5}{n}$.

(c) **[3 points]** Let $h(x) = \displaystyle\int_0^{2x} f(3t)\,dt$. Compute $h'(1)$.