Midterm 1

MAT 126

February 25, 2014

Name: (please print)	**ID #**:
Your recitation: (see list below)	

Lec. 1	**MWF 10am**	**Giulia Sacca**
R01	F 1pm	Yury Sobolev
R02	Tu 4pm	Steven Gindi
R03	Tu 1pm	Joseph Adams
R04	Th 2:30pm	Yu Zeng
R05	M 1pm	Debra Wertz
R06	M 2:30pm	Cheng Hao
R07	W 2:30pm	Cheng Hao
Lec. 2	**TuTh 2:30pm**	**Yaar Solomon**
R08	Tu 4pm	Yu Zeng
R09	Tu 1pm	Kirill Lazebnik
R10	Th 1pm	Xuntao Hu
R11	F 1pm	Tsung-Yin Lin
R12	W 12pm	Chandrika Sadanand
R13	M 10am	Tsung-Yin Lin
R14	M 12pm	Xuntao Hu
Lec. 3	**MW 4pm**	**Artem Dudko**
R15	W 9am	Gao Chen
R16	Tu 10am	Joseph Adams
R17	W 10am	Silvia Ghinassi
R18	Th 4pm	Kirill Lazebnik
R31	W 5:30pm	Chandrika Sadanand
R32	M 5:30pm	Silvia Ghinassi
R33	Tu 1pm	Yury Sobolev

No notes, books or calculators.

You must show your reasoning, not just the answer. Answers without justification will get only partial credit.

Please cross out anything that is not part of your solution — e.g., some preliminary computations that you didn't need.

All answers should be simplified if possible — e.g., sin(0) should be replaced by 0. However, unless instructed, do not replace exact answers by approximate ones — e.g. do not replace $\sqrt{2}$ by 1.41

Each problem is worth 20 pts. If a problem consist of 2 parts ((a) and (b)) each part is worth 10 pts.

	1	2	3	4	5	**Total**
Grade						

1. (a) Write the following integral as a limit choosing the sample points to be the midpoints:

$$\int_0^1 5\cos x \, \mathrm{d}x.$$

Notice: your answer should not contain symbols x_i or Δx. Plug all the formulas in your answer. You don't need to compute the integral.

(b) Write the following limit as a definite integral:

$$\lim_{n\to\infty} \frac{1}{n} \sum_{i=1}^{n} \ln(2 + \tfrac{i}{n}).$$

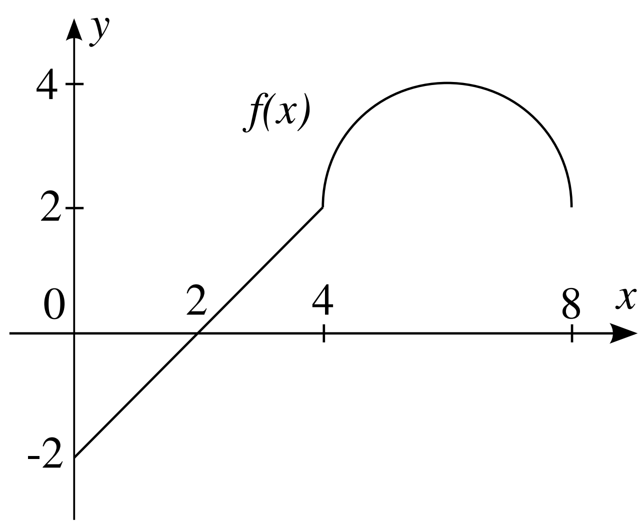
Is the Riemann sum $\frac{1}{n} \sum_{i=1}^{n} \ln(2 + \frac{i}{n})$ an underestimate, an overestimate of this integral or neither one?

Notice: you don't need to compute the integral.

2. (a) Estimate the integral

$$\int_0^8 f(x)\mathrm{d}x$$

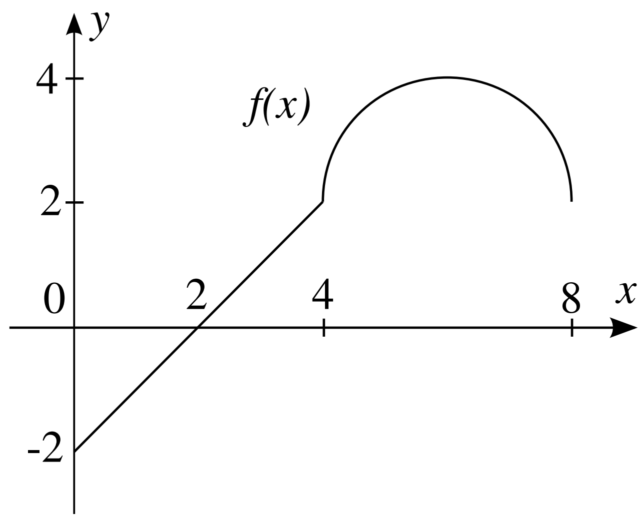
using the right endpoints with $n = 4$ for the function whose graph is shown below.



(b) Find the exact value of

$$\int_0^8 f(x)\mathrm{d}x$$

using geometry.



3. Evaluate the following definite integrals:

$$(a)\ \int_1^5 2u^{\frac{3}{4}}\,\mathrm{d}u; \qquad (b)\ \int_0^{2\pi} (3\sin t - e^t)\mathrm{d}t.$$

4. The velocity function (in meters per second) for a particle moving along a line is given:

$$v(t) = -t^2 + 4.$$

Find (a) the displacement and (b) the distance traveled by the particle during the time interval $0 \leqslant t \leqslant 5$.

Notice: if $v(t)$ changes sign it means that the particle starts moving in an opposite direction. The displacement is the distance between the starting and the end points of the particle. The distance traveled is the total distance traveled by the particle in both directions.

5. Let

$$g(x) = \int_{1}^{x^4} t e^{\frac{t}{2}} \, \mathrm{d}t$$

Compute the derivative $g'(x)$ using the Fundamental Theorem of Calculus.