

NAME(print in CAPITAL letters, first name first): _____

NAME(sign): _____

ID#: _____

Instructions: There are four problems. Some questions are easier than others so you are encouraged to read the entire exam before beginning your work. Make sure that you have all 4 problems.

1

2

3

4

TOTAL

$$\sin A \sin B = \frac{1}{2}(\cos(A - B) - \cos(A + B))$$

$$\sin A \cos B = \frac{1}{2}(\sin(A - B) + \sin(A + B))$$

$$\cos A \cos B = \frac{1}{2}(\cos(A - B) + \cos(A + B))$$

$$\sin^2 A = \frac{1}{2}(1 - \cos(2A)), \quad \cos^2 A = \frac{1}{2}(1 + \cos(2A))$$

1. Multiple choice (5 points each). Circle the correct answer.

(a) Find $\int_{-2}^2 |x| dx$.

0 1 2/3 4/3 4 none of the above

(b) Evaluate $\int_{-1}^1 2 + \sqrt{1 - x^2} dx$.

0 1 2 4 π $2 + 2\pi$
4 + 4 π 4 + π 4 + $\pi/2$ none of the above

(c) Evaluate $\int_{-1}^1 x^2 + |x| dx$.

0 1 2/3 4/3 5/3 8/3 2 3

none of the above

(d) Evaluate $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n e^{k/n}$.

e $e - 1$ $e - 2$ 0 1 e^2

$e^2 - 1$ $e^2 - 2$ none of the above

2. (20 points.)

- (a) Evaluate $\int_{-1}^1 4 + e^{x^2} \sin(2\pi x) dx$.
(Hint: split the integral into two parts.)

- (b) Let A be the answer to part (a). Which of the quantities below is the closest approximation to $\int_{-1}^{1.01} 4 + e^{x^2} \sin(2\pi x) dx$? (Please circle.)

A	$A + 1$	$A + 2$	$A + e^{1.01}$	$A + e^{2.02}$
	$A + \pi$	$A + 2\pi$	$A + 0.01$	$A + 0.02$
	$A + 2.03$	$A + 0.03$	$A + 0.04$	

3. (10 points.) Let $f(x) = \int_0^x \ln(1 - t^3) dt$, $-\frac{1}{2} \leq x \leq \frac{1}{2}$.

What value of x in $[-\frac{1}{2}, \frac{1}{2}]$ maximizes $f(x)$?

4. (40 points.) Evaluate the following integrals.

(a) $\int x\sqrt{4-x^2} dx$

(b) $\int_2^4 \frac{1}{x \ln x} dx$

(c) $\int \frac{1}{\sqrt{e^{2x}-1}} dx$

(d) $\int x^2 \sqrt{x+1} dx$