Math 104

2nd Midterm Make Up (Nov. 5th 2008, 50 Minutes)

Before solving the problems, please read carefully the instructions below and fill in the front page using capital block letters.

Full name: _____

Student Number: _____

Instructor: _____

TA: _____

Recitation Section: _____

Corrector's signature	Sum of points	Grade

(1) Before starting to solve any problem, please fill in the front sheet.
(2) Please write your answers in the table "Your Answer" on the page of each problem. You can *only* get credit for a problem if an answer appears in this table.
(3) No calculators, computers or mobile phones are permitted.
(4) Only one sheet of letter size paper (8.5 in. by 11 in.) is permitted (written on both sides). No scratch paper is permitted.
(5) We are *not* responsible for providing extra paper. Please use the back of the sheets.
(6) Each problem is worth 10 points. We do *not* give partial credit. However, you may get *no* credit for a problem if no work is shown or if, in the sole opinion of the grader, your work (calculations) is incomplete or unclear or if your work (calculations) does not support your answer choice sufficiently.
Please show complete calculations and indicate clearly should you use the back of a sheet for your work.
(7) After the end of the exam you must stop writing and remain quietly seated at your place, your exam copy face-down on your desk, until all copies of the exam are collected.
(8) Exams must remain stapled.

Problem 1. Approximate $\int_0^8 (x^2 - x + 1)dx$ using the midpoint rule with $n = 4$ subdivisions.

Answer choices:
(A) 140
(B) 142
(C) 144
(D) 146
(E) 148
(F) 150

Your answer:	

Problem 2. Evaluate $\int_{-\infty}^{0} 3x^2 e^{x^3+7} dx.$

Your answer:	

Answer choices:

(A) e
(B) e^7
(C) e^5
(D) e^3
(E) e^9
(F) divergent

Problem 3. Which of the following integrals are convergent?

(1) $\int_0^1 x^{-2}dx$ (2) $\int_1^\infty \frac{1}{x\ln(x)}dx$ (3) $\int_1^\infty e^{-x^3}dx$

Answer choices:

(A) All three integrals are convergent.
(B) None of these integrals is convergent.
(C) Only the integral (1) is convergent.
(D) Only the integral (2) is convergent.
(E) Only the integral (3) is convergent.
(F) Only the integrals (2) and (3) are convergent.

Your answer:	

Problem 4. Determine the area of the surface of revolution obtained by rotating the graph of $f(x) = \frac{1}{2}(e^x + e^{-x})$ from $x = 0$ to $x = 1$ around the x-axis.

Answer choices:

(A) $\frac{\pi}{2}(e^2 - e^{-2})$
(B) $\frac{\pi}{4}(e^2 - e^{-2} + 2)$
(C) $\frac{\pi}{8}(e^2 - e^{-2} + 4)$
(D) $\frac{\pi}{2}(e^2 + e^{-2})$
(E) $\frac{\pi}{4}(e^2 + e^{-2} - 2)$
(F) $\frac{\pi}{8}(e^2 + e^{-2} - 4)$

Your answer:	

Problem 5. Determine the arc length of the curve $y = \sqrt{1 - x^2}$ with $0 \leq x \leq 1$.

Answer choices:

(A) $\pi/2$
(B) $\pi/4$
(C) π
(D) 1
(E) $\pi + 1$
(F) $\pi - 1$

Your answer:	

Problem 6. Determine $b > 0$ so that the area of the surface of revolution obtained by rotating the graph $y = x$ between $x = 0$ and $x = b$ around the x-axis is exactly $\pi\sqrt{2}$.

Answer choices:

(A) $b = \frac{1}{2}$
(B) $b = 1$
(C) $b = \sqrt{2}$
(D) $b = 2$
(E) $b = \pi$
(F) $b = \pi/2$

Your answer:	

Problem 7. Which of the following statements is true given the sequences:

$$a_n = n \cdot \tan\left(\frac{1}{n}\right); \qquad b_n = \frac{n + \sqrt{n} + 3}{e^n}; \qquad c_n = (-1)^n \frac{3^{n+2}}{7^n}.$$

Answer choices:

(A) Only the sequences a_n and b_n are convergent.
(B) Only the sequences b_n and c_n are convergent.
(C) All three sequences are convergent.
(D) Only the sequence a_n is convergent.
(E) Only the sequence b_n is convergent.
(F) Only the sequence c_n is convergent.

Your answer:	

Problem 8. Which statement is true about the sequence $a_n = (-1)^{n+1}\frac{\cos(n)}{e^n}$?

Answer choices:

(A) The sequence is divergent, because every alternating sequence is divergent.
(B) The sequence is convergent, because every alternating sequence is convergent.
(C) The sequence is divergent, because of the oscillation of the cosine function.
(D) The sequence is convergent, which can be shown using the squeeze (sandwich) theorem.
(E) The sequence is divergent, because of the combined effect of the alternating sign $(-1)^n$ and the oscillation of the cosine function.
(F) Nothing we have learned so far can help to decide whether the sequence is convergent or divergent.

Your answer:	

Problem 9. Evaluate $\int_1^2 \frac{1}{x(x^2+1)} dx$.

Your answer:	

Answer choices:
(A) $\ln(3) - 1$
(B) $\ln(5)$
(C) $\ln(2)$
(D) $\ln(\sqrt{6/5})$
(E) $\ln(\sqrt{10/5})$
(F) $\ln(\sqrt{8/5})$

Problem 10. Determine $\int_0^1 \sqrt{1-x^2}dx$.

Your answer:	

Answer choices:
(A) $\pi/4$
(B) $\pi/2$
(C) π
(D) 2π
(E) 1
(F) $\pi/6$