Math 120 – Calculus B
Fall Semester 2000
Third Midterm
Tuesday, November 28

Name:_____ **Section:**_____

This examination consists of 14 problems, worth a total of 100 points on 7 pages, including this front cover. If problems are missing from your copy, you must ask for a new copy right away. The first ten problems are multiple choice **with no partial credit for any reason**. Be sure to indicate your single answer to each question by placing an $\times$ through that letter on the answer grid below. Students will **NOT** be allowed extra time to fill in the grid after the exam has ended if they forget to do so during the exam!

1.	**a**	**b**	**c**	**d**	**e**	**6.**	**a**	**b**	**c**	**d**	**e**
2.	**a**	**b**	**c**	**d**	**e**	**7.**	**a**	**b**	**c**	**d**	**e**
3.	**a**	**b**	**c**	**d**	**e**	**8.**	**a**	**b**	**c**	**d**	**e**
4.	**a**	**b**	**c**	**d**	**e**	**9.**	**a**	**b**	**c**	**d**	**e**
5.	**a**	**b**	**c**	**d**	**e**	**10.**	**a**	**b**	**c**	**d**	**e**

The last 4 problems are partial credit problems. Be sure to show all work legibly. Clearly indicate your final answer, which should be simplified whenever possible. **Books, notes and CALCULATORS are NOT permitted. Sign the following honor code statement:**

"On my honor, I have neither given nor received unauthorized aid on this exam."

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1. Which of the following is equal to the binomial coefficient $\binom{5}{3}$?

(a) 4 (b) 5 (c) 6 (d) 10 (e) 20

2. Compute the y-coordinate of the center of mass of a uniform plate bounded by the curves $y = \sqrt{9-x}$, $y = 0$, $x = 0$ and $x = 5$. The area of this region is $A = \frac{38}{3}$ square units.

(a) $\frac{3}{38}\frac{65}{4}$ (b) $\frac{3}{38}\frac{65}{2}$ (c) $\frac{3}{38}\frac{75}{2}$

(d) $\frac{3}{38}\frac{75}{4}$ (e) $\frac{3}{38}\frac{-65}{4}$

3. What integral computes the length along the curve $y = ln(x^2 - 1)$ between $x = 2$ and $x = 3$?

(a) $\int_4^9 \sqrt{1 - \frac{2x}{x^2-1}}\, dx$ (b) $\int_2^3 1 + \frac{4x^2}{(x^2-1)^2}\, dx$

(c) $\int_2^3 \frac{x^2+1}{x^2-1}\, dx$ (d) $\int_2^3 1 - \frac{4x^2}{(x^2-1)^2}\, dx$

(e) $\int_2^3 \sqrt{1 + \frac{2x}{x^2-1}}\, dx$

4. Find an integral which computes the surface area generated by rotating $y = x^3$ around the x-axis between $x = 0$ and $x = 4$.

(a) $\int_3^4 \frac{\pi}{2} x^3 \sqrt{1 + x^4}\, dx$ (b) $\int_3^4 \frac{\pi}{2} x^3 \sqrt{1 + 9x^4}\, dx$

(c) $\int_0^4 2\pi x^3 \sqrt{1 + \frac{x^4}{4}}\, dx$ (d) $\int_0^4 2\pi y^3 \sqrt{1 - 9x^4}\, dx$

(e) $\int_0^4 2\pi x^3 \sqrt{1 + 9x^4}\, dx$

5. What is the chance of getting **at least** two heads when flipping four fair coins?

(a) $\frac{5}{8}$ (b) $\frac{11}{16}$ (c) $\frac{3}{4}$ (d) $\frac{2}{3}$ (e) $\frac{1}{4}$

6. If the demand function is $p = 4 - \frac{x}{20}$, find the consumer surplus when the price is \$3.

(a) 7 (b) 10 (c) 20 (d) 0 (e) 14

7. What is the probability of drawing a spade flush in 5-card stud poker?

(a) $\frac{\binom{13}{5}}{\binom{52}{13}}$ (b) $\frac{\binom{52}{13}}{\binom{13}{5}}$ (c) $\frac{\binom{13}{5}}{\binom{52}{5}}$

(d) $\frac{\binom{13}{5}}{\binom{52}{39}}$ (e) $\frac{\binom{39}{5}}{\binom{52}{5}}$

8. Given only the following information, find the value of the fourth Taylor polynomial when $x = \frac{1}{10}$,$P_4(\frac{1}{10})$. $f(0) = f'(0) = f''(0) = f^{(3)}(0) = 6$ and $f^{(4)}(0) = 48$

(a) 6.6314 (b) 6.6322 (c) 6.6324

(d) 6.6312 (e) 6.6323

9. How does one write the repeating decimal .129129129... as a proper fraction?

(a) $\frac{43}{333}$ (b) $\frac{129}{9999}$ (c) $\frac{129}{909}$ (d) $\frac{43}{3333}$ (e) $\frac{43}{33}$

10. What is the x-coordinate of the centroid of the region bounded by $y = sin(x)$, $y = 0$, $x = 0$ and $x = \pi$?

(a) $\frac{4}{\pi}$ (b) $\frac{2}{\pi}$ (c) 2 (d) $\frac{\pi}{2}$ (e) $\frac{\pi}{4}$

11. (13 pts.) Suppose Hank Aaron was batting .400 one season and in one game he had 4 at bats (where he was not walked). What is the probability he ended that game with exactly two hits? Express your answer as a proper fraction. (Hint: Batting .400 means $p = \frac{2}{5}$.)

12. (13 pts.) Find the third Taylor polynomial $P_3(x)$ for the function $f(x) = (4 - 2x)^{\frac{3}{2}}$.

13. (12 pts.) Use **linear approximation** to estimate $\sqrt{17}$. Be sure to give (and say a few words to justify) an upper bound on the error of this estimate.

14. (12 pts.) A trough with triangular cross-section is filled with water for a horse. If the maximum depth is 1 meter and the maximum width is 2 meters, what is the hydrostatic force on the end of the trough. (You do not need to give an explicit Riemann sum, because it is implicit in the integral you will solve.)