Math 120 – Calculus B
Fall Semester 2000
Second Midterm
Thursday, October 26

Name:_____ **Section:**_____

This examination consists of 15 problems, worth a total of 100 points on 8 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 5 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."

_____

1. Which of the following is equal to $\log_{10}(1.25) + \log_{10}(80)$?

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

2. Which of the following is NOT equal to e?

(a) $ln(1)$ (b) $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$ (c) $\lim_{n\to\infty}(1+\frac{1}{n})^n$

(d) $\sqrt{e^2}$ (e) $e^{e^{ln(1)}}$

3. Find the value of the following:

$$\lim_{x\to\infty} \frac{sin(x)}{x}$$

(a) e (b) π (c) 1 (d) 0 (e) $-e$

4. Determine the limit of the expression:

$$\lim_{x \to 1^+} x^{\frac{1}{x-1}}$$

(a) 0 (b) 1 (c) e (d) $\frac{1}{e}$ (e) π

5. Which of the following is the indefinite integral of $sec(x)$?

(a) $tan^2(x) + C$ (b) $sec(x)tan(x) + C$

(c) $ln|sec(x)tan(x)|$ (d) $ln|cos(x)| + C$

(e) $ln|sec(x) + tan(x)| + C$

6. In order to use integration by parts to find $\int x^2 ln(x)\ dx$ which of the following is the most effective?

(a) $u = x$ (b) $dv = xln(x)\ dx$ (c) $u = ln(x)$

(d) $dv = ln(x)\ dx$ (e) $u = x^2$

7. Which of the following is the best choice to use integration by parts in computing

$$\int \frac{x^3}{\sqrt{3x^2+4}}?$$

(a) $u = x$ (b) $dv = \frac{x}{\sqrt{3x^2+4}}$ (c) $dv = x^3\ dx$

(d) $u = x^3$ (e) $dv = \frac{x^2}{\sqrt{3x^2+4}}$

8. Which of the following best represents the technique presented in class to integrate $sin^3(x)cos^4(x)$?

(a) Use the double angle formulas

(b) Rewrite as $(sin(x)cos(x))^3cos(x)$ and substitute $u = sin(x)cos(x)$

(c) Rewrite as $sin^3(x)(1 - sin^2(x))^2$ and substitute $u = sin(x)$

(d) Rewrite as $sin(x)(1 - cos^2(x))cos^4(x)$ and substitute $u = cos(x)$

(e) Rewrite as $sin^3(x) - sin^7(x)$

9. As discussed in class, the simplest way to integrate $sec^3(x)tan^3(x)$ is which of the following?

(a) Rewrite as $(sec(x)tan(x))^2 sec(x)tan(x)$ and substitute $u = sec(x)tan(x)$

(b) Rewrite as $(tan^2(x)+1)tan^3(x)sec^2(x)$ and substitute $u = tan(x)$

(c) Rewrite as $(sec(x)tan(x))^3$ and substitute $u = sec(x)tan(x)$

(d) Rewrite as $sec^2(x)(sec^2(x)-1)sec(x)tan(x)$ and substitute $u = sec(x)$

(e) This integral is not accessible with the techniques discussed in class

10. Which trigonometric substitution is most appropriate to compute

$$\int \frac{x^2}{\sqrt{x^2+16}}\, dx?$$

(a) $x = 4tan(\theta)$ (b) $x = 4sec(\theta)$ (c) $x = 4sin(\theta)$

(d) $\theta = 4sec(x)$ (e) $\theta = 4tan(x)$

11. Use logarithmic differentiation to find the derivative of

$$y = \frac{x^{1/4}\sqrt{x^2 - 4x}}{(4x + 2)^3}.$$

12. Find the limit of the following expression

$$\lim_{x \to 1} \frac{cos(\frac{\pi}{2}x)}{sin(\pi x)}.$$

Be sure to identify each indeterminate form and to justify each application of l'Hospital's Rule.

13. Integrate the following

$$\int x^5 ln(x)\ dx.$$

Show all work.

14. Compute the following indefinite integral

$$\int \sqrt{25 - x^2}\ dx.$$

Be sure to justify removing any absolute values.

15. Find the indefinite integral

$$\int \frac{4x}{(x-2)(x^2+4)}\, dx.$$