MTH 133 - 11/03/98 SECOND MIDTERM	Fall 98 A. Corso - A. Minut	Name: ________________________ __________________________

PLEASE, BE NEAT AND SHOW ALL YOUR WORK; CIRCLE YOUR ANSWER.

Problem Number	Possible Points	Points Earned
1	15	
2	15	
3	30	
4	10	
5	10	
6	10	
7	10	
Bonus	5	
TOTAL	100	

1. Use l'Hôpital's rule to find the following limits

$(a)\ \lim\limits_{x \longrightarrow 0} \frac{\sin x}{\sinh x};$

$(b)\ \lim\limits_{x \longrightarrow \infty} x^3 e^{-x^2};$

$(c)\ \lim\limits_{x \longrightarrow \infty} \frac{\ln(\ln x)}{\sqrt{x}}.$

pts: /15

2. Find the derivative of each of the following functions

(a) $y = x\tan^{-1}x + \ln\sqrt{1-x^2}$;

(b) $e^{\tanh x}\ln(\sinh x)$.

pts: /15

3. Evaluate the following integrals

$(a)\ \displaystyle\int_0^{\ln 2} \tanh(2x)\,dx;$

$(b)\ \displaystyle\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{2\cos\theta}{1+\sin^2\theta}\,d\theta;$

$(c)\ \displaystyle\int \frac{\sec^2 y\,dy}{\sqrt{1-\tan^2 y}}.$

pts: /30

4. Simplify the following expressions

(a) $\operatorname{sech}(\ln x) =$ ________________________;

(b) $\cos(\sin^{-1} x) =$ ________________________, for $-1 \leq x \leq 1$.

pts: /10

5. Use integration by parts to evaluate the integral

$$\int y \cosh(ay)\, dy,$$

where a is any constant.

pts: /10

6. Use partial fractions to evaluate the integral

$$\int \frac{x+1}{x^2(x-1)}\,dx.$$

pts: /10

7. Use a trigonometric substitution to evaluate the integral

$$\int \frac{dx}{(x^2+1)^2}.$$

pts: /1o

Bonus. Evaluate the integral

$$\int \sec^4\theta\, d\theta.$$

(*Hint:* use the fact that $\sec^2\theta = 1 + \tan^2\theta$ and that $\sec^4\theta = \sec^2\theta \sec^2\theta$.)

pts: /5