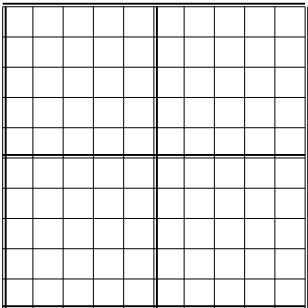


MATH 161 FINAL EXAM, FALL 2003

Part I. Basic skills. Pencil and paper only!		Name:	Score	
In problems 1-4, find the derivative y'			1	11
1.	a) $y = \sqrt{5x}$	b) $y = x^2 \sin(3x)$	2	12
			3	13
			4	14
			5	15
			6	16
			7	17
			8	18
			Ans:_____.	
2.	a) $y = \sin^2 5t$	b) $y = \sec(x^2 + 1)$	9	19
			10	20
			Tot	
			Ans:_____.	
3.	a) $y = \tan^{-1}(\sqrt{x})$	b) $y = \cos(\sin(\ln x))$	Ans:_____.	
			Ans:_____.	
4.	a) $y = \ln(\sqrt{x^2 + 1})$	b) $4xy^2 - y^3 = 1$ (Implicit Differentiation)	Ans:_____.	
			Ans:_____.	
5.	a) Find: $\lim_{x \rightarrow 1} \frac{x^6 - 1}{x^4 - 1}$.	b) Find: $\lim_{x \rightarrow 0} \frac{\cos x - 1}{5x^2}$.	Ans:_____.	
			Ans:_____.	
Extra Space				

In 6-9, find the given integrals.		Name:
6.	a) $\int \frac{x^4 + 2}{x^2} dx.$	b) $\int t^3(2 - t^4)^5 dt.$
	Ans: _____.	Ans: _____.
7.	a) $\int 4 \sin^3 5t \cos 5t dt.$	b) $\int \sec^2 7x dx.$
	Ans: _____.	Ans: _____.
8.	a) $\int_0^1 z \sqrt{1 - z^2} dz.$	b) $\int x \sinh(3x^2) dx.$
	Ans: _____.	Ans: _____.
9.	a) $\int \frac{e^x}{\sqrt{1 - e^{2x}}} dx.$	b) $\frac{d}{dx} \int_1^{\sqrt{x}} \cos(t^2 - 1) dt.$
	Ans: _____.	Ans: _____.
10	An Indiana Jones thug falls off from a high rope bridge. a) What is his speed after 3 seconds?	b) How far has he fallen in 3 seconds?
	Ans: _____.	Ans: _____.
	Extra Space	

11	Find the extrema, IP's and asymptotes of $f(x) = \frac{x}{x^2 + 9}$. Graph the function	
Max: _____ min: _____		IP's: _____ Asy: _____

12	A track field consists of a rectangular region with semicircular regions at the ends. The track must be designed to maximize the area keeping the perimeter at 400 m. a) Write the objective function and the constraint.	b) Find the dimensions of the rectangular region.
Ans: _____		Ans: _____

13	A girl flies a kite at a height of 300 ft, the wind carrying the kite horizontally away from her at a rate of 25 ft/sec. How fast must she let out the string when the kite is 500 ft away from her?	
		Ans: _____

14	a) Find the "c" of the MVT for $f(x) = x^2 + 2x$ on $[0, 1]$	b) Sketch a smooth curve with the properties: $f(0) = 0$; $f''(x) < 0$ for $x < 0$; and $f''(x) > 0$ for $x > 0$.
Ans: _____		

15	Let $f(x) = x^x$. Use logarithmic differentiation to find: a) $f'(x)$.	b) The critical points of $f(x)$.
Ans: _____		Ans: _____

Name: _____

16 Explain what is meant by a Riemann sum for $f(x)$ on the interval $[a, b]$.

17 Find the area bounded by $x = y$ and $x = 5y - y^2$

a) Sketch the region and set up the integral.

b) Evaluate the integral.

Ans: _____.

18 The region in the first quadrant bounded by $y = 4 - x^2$ is rotated about the y -axis. Find the volume.

Ans: _____.

19 The region bounded by $y = x$, $y = 4 - x$ and $x = 0$ is rotated about the x -axis. Find the volume.

Ans: _____.

20 A spring has a natural length of 1 m. A force of 24 N stretches the spring to a length of 1.24 m.

a) Find the spring constant.

b) Find the work required to stretch the spring from 1.24 m to 1.48 m.

Ans: _____.

Ans: _____.

Extra Space