MATH 161 FINAL EXAM, Spring 2021

Part I. Basic skills. Pencil and paper only!	Name:		Score	
In problems 1-4, find the derivative y'			1	11
1. a) $y = \sqrt{\sin 16x}$	b) $y = \cot(x^2 + 1)$		2	12
			3	13
			4	14
			5	15
			6	16
			7	17
Ans:_____.	Ans:_____.		8	18
2. a) $y = 4x(3x+2)^5$	b) $y = \sin^{-1}(\ln 2x)$		9	19
			10	20
			Tot	

2. a) $y = 4x(3x+2)^5$	b) $y = \sin^{-1}(\ln 2x)$
Ans:_____.	Ans:_____.
3. a) $y = e^x \cos^3 4x$	b) $y = \ln(\sec x + \tan x)$
Ans:_____.	Ans:_____.
4. a) $y = \ln \dfrac{x^2(4x+3)^7}{\sqrt{2x+1}}$.	b) $3y + x^2 e^{5y} = 1$ (Implicit Differentiation)
Ans:_____.	Ans:_____.
5. a) Find: $\lim\limits_{x \to 0} \dfrac{e^{3x} - 1}{x}$.	b) Find: $\lim\limits_{x \to \infty} \dfrac{\sqrt{4x^2 - 25}}{3x + 2}$.
Ans:_____.	Ans:_____.
Extra Space	

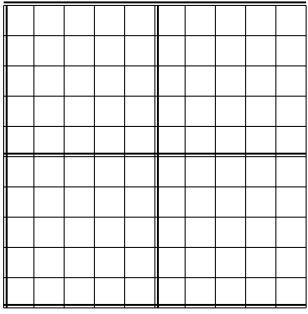| In 6-9, find the given integrals.	Name:
6. a) $\displaystyle\int \frac{4e^x}{1+e^{2x}}\,dx.$ Ans:_____.	b) $\displaystyle\int \frac{t}{(9+5t^2)^4}\,dt.$ Ans:_____.
7. a) $\displaystyle\int_0^{\pi/4} 5\sec^3 x \tan x\,dx.$ Ans:_____.	b) $\displaystyle\int_0^1 \frac{x}{\sqrt{1-x^4}}\,dx.$ Ans:_____.
8. a) $\displaystyle\int_0^{\pi^2/4} \frac{\sin\sqrt{z}}{\sqrt{z}}\,dz.$ Ans:_____.	b) $\displaystyle\int_1^{e^2} \frac{\ln^3 x}{x}\,dx.$ Ans:_____.
9. a) $\displaystyle\int \frac{x-4}{x+4}\,dx.$ Ans:_____.	b) $\displaystyle\frac{d}{dx}\int_1^{\sin x} te^{-t^3}\,dt.$ Ans:_____.
10 A flare is fired straight up in the air with a velocity of 24 m/s. a) What is the speed after 3 seconds? Ans:_____.	b) What is the height after 3 seconds? Ans:_____.
Extra Space 	

11 Find the extrema, IP's and asymptotes of $f(x) = \dfrac{4}{x^2+1}$. Graph the function

Max:_____. min:_____.   IP's:_____. Asy:_____.

12 An open-top box is to be made by cutting squares off the corners of a 18×18 in sheet of tin and bending up the sides. Find the dimensions that will result in a maximum volume.

Ans:_____.

13 When an spherical balloon is heated, its radius increases at the rate of 0.02 cm/min. At what rate is the volume increasing when the radius is 20 cm.

Ans:_____.

14 a) State precisely the Mean Value Theorem.

b) Find the "c" of the MVT for $f(x) = 3x^2 - 6x$ on $[1, 4]$

Ans:_____.

15 Use logarithmic differentiation to find $f'(x)$.
a) $f(x) = 9^x$.

b) $f(x) = (\sec x)^x$.

Ans:_____.   Ans:_____.

| 16 | Write the Riemann sum for the area under $f(x) = \ln x$ in the interval $[1, 2]$. |

| 17 | Find the area bounded by $y = x^2 + 1$ and $y = x^2 - 3$ |
a) Sketch the region and set up the integral.   b) Evaluate the integral.

Ans:_____.

| 18 | The region in the first quadrant bounded by $y = x^2$, $y = 1$ is rotated about the $x = 1$. Find the volume. |

Ans:_____.

| 19 | The region bounded by $x = 4y - y^2$ and $x = 0$ is rotated about the x-axis. Find the volume. |

Ans:_____.

| 20 | Let $f(x) = 1 + x^2$ on the interval $[-1, 2]$. |
a) Find the Average of $f(x)$.   b) Find the "c" of the integral MVT.

Ans:_____.   Ans:_____.

Extra Space