

NAME (*please print*): _____

HONOR CODE PLEDGE: _____

SIGNATURE: _____

Please write your answers clearly to all problems, showing all work. You are not allowed to use any notes or review sheets or calculators during the exam. You have exactly 50 minutes to complete the exam. Good Luck!

Problem Number	Possible Points	Points Earned:
1	20	
2	20	
3	20	
4	20	
5	10	
6	9	
Total:	99	

(20) 1. Please differentiate the following functions with respect to x :

(a) $f(x) = \frac{(x+2)(x+3)}{(x^2-4)}$

(b) $f(x) = e^{5x} \cdot \ln(\sin(x^{17} + 3x^3 - 1590))$

(c) $f(x) = \operatorname{Arccsc} \left(\cot \left(\sqrt{\sec \left(\frac{x}{11} \right)} \right) \right)$

- (20) 2. A calculus student 6ft tall in their way to an evening review session walks at a rate of 5ft/sec towards a streetlight that is 16 ft above ground. At what rate is the length of their shadow changing when they are 10 ft from the base of the streetlight?

- (20) 3. Please find the equation of the tangent line to the curve

$$y^2 + y = x^3 - x$$

at the origin.

- (20) 4. Please find the slope of the normal line to graph of the function

$$y = \cos(x)^{\tan(x)}$$

when $x = 0$.

- (10) 5. Please use linear approximation to find a good approximation of $28^{1/3}$.

- (9) 6. **(Extra Credit)** Please carefully draw and label the graphs of the functions $\text{Arcsec}(x)$, $\text{Arccot}(x)$, $\text{Arccsc}(x)$, together with their domains and ranges.