

Name: \_\_\_\_\_

1. Let  $f(x) = e^{|x|}$ . (For the problems below, you can show some work for partial credit purposes if you wish.)

(a) State the domain of  $f(x)$ .

5 pts

(b) State the range of  $f(x)$ .

5 pts

2. Let  $g(x) = \ln[\tan^{-1}(x)]$ . (For the problems below, you can show some work for partial credit purposes if you wish.)

(a) State the domain of  $g(x)$ .

5 pts

(b) State the range of  $g(x)$ .

5 pts

3. Circle TRUE or FALSE (no partial credit).

(a) If  $0 < a < b$ , then  $\ln a < \ln b$ .    TRUE    FALSE

5 pts

(b) If  $a < b$ , then  $e^a < e^b$ .    TRUE    FALSE

5 pts

(OVER)

4. Find the derivative of  $\ln |\sec(5x) + \tan(5x)|$ .

10 pts

5. USE LOGARITHMIC DIFFERENTIATION to derive a formula for  $\frac{d}{dx} 2^x$ .

10 pts

6. Evaluate the integrals EXACTLY. Show your substitutions.

(a)  $\int \frac{\operatorname{sech}^2 x}{2 + \tanh x} dx$

10 pts

(b)  $\int \frac{x}{\sqrt{x^4 - 1}} dx$

10 pts

(c)  $\int \frac{dt}{16 + t^2}$

10 pts

(OVER)

7. Calculate the limits using exact methods. (Do not use decimal approximations in your answer.) Show the use of L'Hospital's Rule if applicable.

(a)  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2 + x}$

10 pts

(b)  $\lim_{x \rightarrow \infty} x^2 e^{-x}$

10 pts