Exam 1

Name (20 pts): _____

1. Write $\sqrt{\sin\sqrt{x}}$ as the composition of two functions.

2. Fred hops on his bike and heads due east. His distance from home t hours after leaving is $D(t) = 15t + 20\sqrt{t}$. Use the definition of the derivative to find a formula for $D'(t)$.

3. Use the formula you found in 2 to determine how far Fred has travelled when he is moving at 20 miles per hour.

4. Determine $\lim_{x \to 1} \ln(x^2 - 1) - \ln(x - 1)$ algebraically.

5. Determine $\lim_{x \to 1} \ln(x^2 - 1) - \ln(x - 1)$ numerically.

6. Use the laws of continuity to determine where $\ln(x^2 - 1) - \ln(x - 1)$ is continuous.

7. Determine where the function graphed below is continuous.

8. For the function $f(x)$ graphed in 7, evaluate the limit graphically if it exists.

$\lim_{x\to -3} f(x)$	
$\lim_{x\to -3^+} f(x)$	
$\lim_{x\to -3^-} f(x)$	
$\lim_{x\to 0} f(x)$	
$\lim_{x\to 0^+} f(x)$	
$\lim_{x\to 0^-} f(x)$	
$\lim_{x\to 3} f(x)$	
$\lim_{x\to 3^+} f(x)$	
$\lim_{x\to 3^-} f(x)$	

9. For the function $f(x)$ graphed below, fill in the table below with +, -, or 0, to tell where $f(x)$ and $f'(x)$ are positive, negative, or zero.

x	$f(x)$	$f'(x)$
-3		
0		
3		

10. Suppose you buy a car for $\$10,000$ in 1990. If the car depreciates continuously to half its original value in 5 years, determine how long it will take the car's value to drop by $\frac{1}{3}$.