

1.) Evaluate the following limits..

a.)  $\lim_{x \rightarrow \infty} \frac{x^2 - 3x + 5}{5x^2 + 7x - 8}$     b.)  $\lim_{x \rightarrow 1^+} \left( \frac{1}{x-1} - \frac{1}{\ln x} \right)$     c.)  $\lim_{x \rightarrow \infty} (\ln(x+100) - \ln(x+25))$

d.)  $\lim_{x \rightarrow 0} \frac{x^2}{\ln(\sec x)}$     e.)  $\lim_{x \rightarrow 0} \frac{\sin x - x \cos x}{x - x \cos x}$     f.)  $\lim_{x \rightarrow 0^+} x \ln x$

g.)  $\lim_{x \rightarrow \infty} \frac{x^5}{e^{x^3}}$     h.)  $\lim_{x \rightarrow \infty} \frac{x^5}{e^x}$     i.)  $\lim_{x \rightarrow 0} \frac{(\sin 4x)(\sin 3x)}{x \sin 2x}$

2.) Let  $y = f(x)$  be a differentiable and one-to-one function. Derive a formula for the derivative of the inverse function  $y = f^{-1}(x)$ .

3.) Differentiate each function. Do not simplify answers.

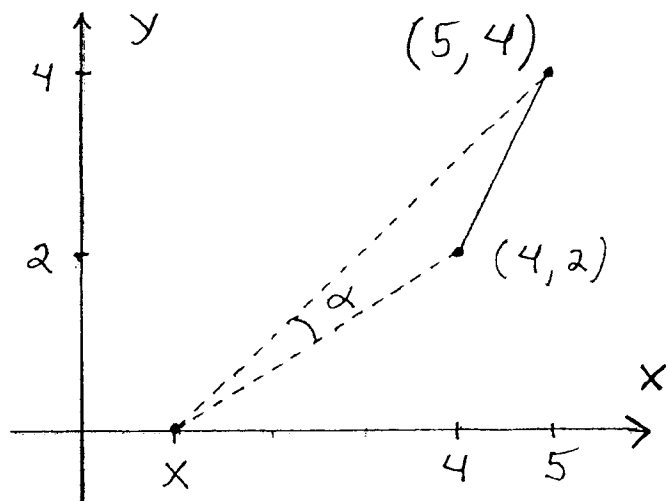
a.)  $y = \arcsin(x^2 \ln x)$     b.)  $y = \arctan \sqrt{\frac{3-x}{x^2+5}}$   
 c.)  $g(x) = 5^x \cdot \arccos(5^x)$     d.)  $y = (\arctan(\arcsin(e^{\arccos x})))^3$

4.) Consider the given diagram below. Evaluate each limit intuitively.

a.)  $\lim_{x \rightarrow \infty} \alpha$     b.)  $\lim_{x \rightarrow -\infty} \alpha$     c.)  $\lim_{x \rightarrow 3} \alpha$

Write angle  $\alpha$  as a function of  $x$ .  
 Determine  $x$  so that  $\alpha$  is an absolute

c.) minimum.    d.) maximum.



5.) For what values of the constants  $a$  and  $b$  is  $\lim_{x \rightarrow 0} (x^{-3} \sin 3x + ax^{-2} + b) = 0$