1. h   Evaluate the following limits using the appropriate technique or theorem. Show all your work.

a)

$$\lim \frac{4 - \frac{1}{} + 3}{ - 1}$$

b)

$$\lim \frac{- 3 + 15}{17 + 4 - 8}$$

c)

$$\lim \frac{- 2\sin 3}{}$$

d)

$$\lim \ (+)\cos \frac{1}{} + 2$$

2. Consider the piece-wise function defined below.

$$(\ ) = \begin{cases} \dfrac{- 1}{ + 1} & < - 1 \\ & = - 1 \\ 2 & > - 1 \end{cases}$$

a)   h   Find the limit, if it exists:

$$\lim \ (\ )$$

b)   h   Find the value of   that makes the function   ( ) continuous at   = − 1. Justify your answer.

3.   h   Use ____ the limit definition (the four-step process) to find the derivative of:

$$(\ ) = \quad -3 + 18$$

4.   h   Use the appropriate rules to find the derivative of the following functions. <u>Do NOT simplify your answer</u>.

a)
$$= (\tan 5 \ - \csc 3 \ )$$

b)
$$=$$

9. ˈh   You are staying at a resort and want to visit a secluded island off the coast. The diagram below illustrates all the distances. Your transportation options are a land taxi at 1$/km, and a water taxi at 5$/km. What distance should you cover with the water taxi in order to your total transportation cost?

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10. Consider the function:

$$( ) = \quad - \frac{2}{ }$$

    a)   ˈh   Find the horizontal and vertical asymptotes, if any.

    b)   ˈh   Determine the intervals where ( ) is increasing, where it is decreasing, and identify any relative extrema.

    c)   ˈh   Determine the intervals where ( ) is concave up, where it is concave down, and identify any inflection points.

    d)   ˈh   Sketch the function using the above information and extra points as needed.
    .

11.   ˈh   Consider the function

$$( ) = \quad + 1$$

    a) Find a value   [0,3] that satisfies the Mean Value Theorem for <u>differentiation</u>.
    b) Find a value   [0,3] that satisfies the Mean Value Theorem for <u>integration</u>.

12. ˈh   Given   ( )   = 6,   ( )   = − 4 and   ( )   = 3, calculate:

$$( ) \quad + \quad \frac{1}{2} ( ) - 3 ( )$$

13. ˙h

bounded below by

$$( ) = - \frac{2}{\quad}$$

and between the lines = − 1 and = 1.

°
_____

1.

      a. —

      b. —

      c. − 6

      d. 0

2

      a. − 2

      b. − 2

      c.   = − 2

3.   ( ) = 2 − 3

4.

      a.   = 8($\tan 5$ − $\csc 3$) ($5 \sec$ 5

   c. Concave up on $(-\infty, 0)$ $\left(2, \infty\right)$, concave down on $\left(0, 2\right)$, and one inflection point at $\left(2, 0\right)$.

   d.

11.

   a. $= -$

   b. $= \sqrt{3}$

12. -21

13.

   a. $13\sec\theta + \;=\cot\theta +$

   b. $-8\tan\theta - 5\csc\theta +$

14. 2

15. $\ln 4 + -\sim 3.72$ /

16. $f() = -7\cos + 5\sin + 7$