MT111: Calculus and Analytical Geometry

Worksheet 4

Due 3:30 pm, Fri Sep 28

fall 2018

Problem 1

Express the given quantity as a single logarithm.

(a) $ln(5) + 5ln(3)$

(b) $\frac{1}{2}ln(x+2)^3 + \frac{1}{2}[ln(x) - ln(x^2+3x+2)^2]$

Problem 2

Consider the following function. $f(x) = \ln(x-1) - 1$

(a) What are the domain and range of f?

(b) What is the y-intercept of the graph of f?

(c) Sketch the graph of f.

Problem 3

Consider the following function. $f(x) = \cos x$

(a) Find the domain of f for whcih the function is invertible.

(b) Find $f^{-1}(x)$.

(c) Sketch the graph of $f^{-1}(x)$ for the appropriate domain.

Problem 4

If a rock is thrown upward on the planet Mars with a velocity of 10 m/s, its height in meters t seconds later is given by $y = 10t - 1.86t^2$. Estimate the instantaneous velocity of the particle when t=1 using the following intervals.

(i) $[1, 2]$

(ii) $[1, 1.5]$

(iii) $[1, 1.1]$

(iv) $[1, 1.01]$

(v) $[1, 1.001]$

Problem 5

(a) Explain what it means to say that

(i) $\lim_{x \to 3^-} = 1$

(ii) $\lim_{x \to 3^+} = 4$

You can explain using a graph.

(b) In this situation is it possible that $\lim_{x \to 1} f(x)$ exists? Explain.

Problem 6

For the function f whose graph is given, state the value of each quantity, if it exists. If it does not exist, explain why.

a) $\lim_{x \to 1} f(x)$

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

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

d) $\lim_{x \to 3} f(x)$

e) $f(3)$

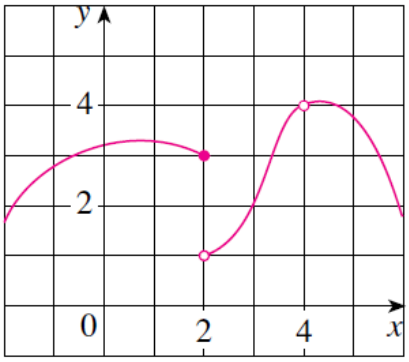

Figure 1: Graph 1

Problem 7

Given $\lim_{x \to a} f(x)$, compute the limit by plugging in different values of x near a

a) $\lim_{x \to 0} \dfrac{\sin(\pi x)}{x}$

b) $\lim_{x \to 3} \ln(x^2 - 9)$

c) $\lim_{x \to 1} (1 + x)^{\frac{1}{x}}$

d) $\lim_{x \to \frac{\pi}{2}} \dfrac{\sin(x) - 1}{x - \frac{\pi}{2}}$