Math 1431 – Fall 2018

Test 1 Review

Instructions: Number 2 does not need to be turned in but for all other problems, copy the problem on your paper, show your work and box your answers. Draw a horizontal line to separate each problem. This review is due in lab the week of Test 1. Online students will upload as "EHW3" under the assignments tab. The review will not be returned to you so please make a copy before submitting

1. State the following theorems and definitions:
    a. Definition of the limit of a function (delta-epsilon precise version)
    b. Definition of f is continuous at a point c (list the 3 conditions)
    c. Definition of Removable discontinuity
    d. Definition of Infinite discontinuity
    e. Definition of Jump discontinuity
    f. The Intermediate Value Theorem
    g. The Extreme – Value Theorem
    h. The Pinching Theorem
    i. Definition of a derivative (the limit definition)
2. Work examples from 1.1 in the sections labeled:
    a. Domain and Range
    b. Inverse of a Function
    c. Asymptotes and Holes
    d. Rational Functions
    e. Solving trig equations
    f. Finding exact values for trig functions, inverse trig functions and their composites
3. Find the following limits (if they exist):

    a. $\lim_{x->0} \frac{\sin 4x}{5x} =$

    b. $\lim_{x->0} \frac{\sqrt{4+x}-2}{x} =$

    c. $\lim_{x->0} \frac{\left(\frac{1}{x+1}-1\right)}{x} =$

    d. $\lim_{x->-3} \frac{x^2+x-6}{x^2-9} =$

    e. $\lim_{x->0} \left(x\left(2-\frac{1}{x}\right)\right) =$

    f. $\lim_{x->0} \frac{2\sin x \cos x}{2x} =$

    g. $\lim_{x->0} \frac{5x}{\tan(9x)} =$

    h. $\lim_{x->0} \frac{\sin(x^2)}{6x} =$

4. Determine if the following are continuous. If the function is not continuous, state the type of discontinuity.

a. $f(x)=\begin{cases} x^2+1 & x<1 \\ 8 & x=1 \\ x^3 & x>1 \end{cases}$

b. $f(x)=\begin{cases} 2x^2 & x<2 \\ 8 & x=2 \\ x^3 & x>2 \end{cases}$

c. $f(x)=\begin{cases} 5-x & x<-2 \\ 7 & x=-2 \\ x^2-5 & x>-2 \end{cases}$

d. $f(x)=\begin{cases} x^2 & \text{if } x<-1 \\ x+2 & \text{if } x\geq -1 \end{cases}$

5. Let

$$f(x)=\begin{cases} x+1 & \text{if } x\neq 3 \\ k & \text{if } x=3 \end{cases}$$

For what value of k would $f(x)$ be continuous at $x=3$?

6. Find A and B so that $f(x)$ is continuous:

$$f(x)=\begin{cases} 6x^2-1 & x<-1 \\ A & x=-1 \\ Bx+3 & x>-1 \end{cases}$$

7. Use the definition of derivative to find the derivative of the following:
   a. $f(x)=3x^2-x+2$
   b. $f(x)=\dfrac{2}{x+5}$
   c. $f(x)=\sqrt{x+1}$

8. Use the intermediate value theorem to show that the function $f(x)=2x^5+3x+1$ has a root on the interval $[-1,2]$.

9. State the domain and range for each:
    a. $f(x) = \sqrt{4 - x}$
    b. $f(x) = \sin(x)$
    c. $f(x) = \sqrt[3]{x + 5}$
    d. $f(x) = \frac{2}{x-3}$
10. Find the inverse for each function:
    a. $f(x) = \sin(x)$
    b. $f(x) = \sqrt[3]{x + 5}$
    c. $f(x) = \frac{2}{x-3}$
11. Find all asymptotes and any holes for each function:
    a. $f(x) = \frac{2}{x-3}$
    b. $f(x) = \frac{x+5}{x^2+3x-10}$
12. Find the exact value for each:
    a. $sin^{-1}\left(-\frac{1}{2}\right)$
    b. $cos^{-1}\left(-\frac{1}{2}\right)$
    c. $sec\left(tan^{-1}\left(\frac{2}{3}\right)\right)$
13. Find all solutions in the interval $[0, \pi]$ for each equation :
    a. $\cos(2x) = 0$
    b. $\sin(4x) = \frac{1}{2}$
14. Find the largest δ possible if $\varepsilon = \frac{1}{10}$ and $\lim_{x \to 2}(3x - 7) = -1$.