Math 150 Name: _____

QUIZ ON CHAPTERS 1 AND 2

REVIEW / LIMITS AND CONTINUITY; MATH 150 – FALL 2016 – KUNIYUKI
105 POINTS TOTAL, BUT 100 POINTS = 100%

Show all work, simplify as appropriate, and use "good form and procedure" (as in class).
Box in your final answers! You may not use L'Hôpital's Rule for finding limits.
No notes, books, or calculators allowed.

Check one:

Can you easily print files from the class website?

☐ Yes. I can print exam solutions.

☐ No. Give me exam solutions in class.

1) If $f(x) = x^{2/3}$, then the graph of $y = f(x)$ in the usual (Cartesian) *xy*-plane is symmetric about what? (Box in one:) (2 points)

the *x*-axis the *y*-axis the origin none of these

2) Fill in the blanks. Find rules for functions f and g so that $(f \circ g)(x) = f(g(x)) = \sin(x^3)$. (We are decomposing a composite function.)

$g(x) =$ _____ $f(u) =$ _____

(Do not let f or g be the identity function.) (2 points)

3) Complete the Identities. Fill out the table below so that, for each row, the left side is equivalent to the right side, based on the type of identity (ID) given in the last column. (10 points total; 2 points each)

Left Side	Right Side	Type of Identity (ID)
$\sin(u+v)$		Sum ID
$\cos(u-v)$		Difference ID
$\sin(2u)$		Double-Angle ID
$\cos(2u)$		Double-Angle ID (write any one of our three versions)
$\cos^2(u)$		Power-Reducing ID (PRI)

4) Fill out the table below. Use interval form (the form using parentheses and/or brackets) except where indicated. You do not have to show work. (6 points)

$f(x)$	Domain	Range
$\sin(x)$		
$\cot(x)$	Use set-builder form.	
$\sec(x)$	Use set-builder form.	

5) Find all real solutions of $2\sin(4x)-\sqrt{2}=0$ in radians. (8 points)

When evaluating limits, give a real number, ∞, $-\infty$, or DNE (Does Not Exist). Write ∞ or $-\infty$ when appropriate. If a limit does not exist, and ∞ and $-\infty$ are inappropriate, write "DNE."

6) Evaluate the following limits. **Box in your final answers.** (15 points total)

a) $\lim_{\theta\to\left(\frac{\pi}{2}\right)^-}\tan(\theta)$ **Answer only is fine.** (2 points)

b) $\lim_{r \to 7} \dfrac{\dfrac{1}{r} - \dfrac{1}{7}}{r - 7}$ **Show all work.** (7 points)

c) $\lim_{x \to 0} x^4 \sin\left(\dfrac{1}{\sqrt[3]{x}} \right)$ **Show all work, as in class.** (6 points)

7) Consider $f(x) = \dfrac{x+1}{x^2 - 3x - 10}$ and the graph of $y = f(x)$ in the usual *xy*-plane in parts a) through e). (16 points total)

a) Find $\lim_{x \to -2^-} f(x)$. **Show all work, as in class.**

b) Find $\lim_{x \to \infty} f(x)$. **Answer only is fine.**

c) Find the equation(s) of the vertical asymptote(s) (VAs) of the graph of $y = f(x)$. **Answer only is fine.**

d) Find the equation of the horizontal asymptote (HA) of the graph of $y = f(x)$. **Answer only is fine.**

e) How many holes does the graph of $y = f(x)$ have? **Answer only is fine.**

8) Consider $f(x) = \dfrac{5x^4}{2x^4 - 18x^2}$ and its graph in the usual *xy*-plane. (16 pts. total)

a) Find $\lim_{x \to \infty} f(x)$. **Give a rigorous solution (no short cuts!).**

b) Find the equation(s) of the vertical asymptote(s) (VAs) of the graph of $y = f(x)$. **You should show some work.**

c) Find the equation of the horizontal asymptote (HA) of the graph of $y = f(x)$. **Answer only is fine.**

d) Where is the hole on the graph of $y = f(x)$? Write the *x*- and *y*-coordinates in (x, y) form. **Answer only is fine.**

9) Write a precise ε-δ definition of $\lim_{x \to a} f(x) = L \ \left(a, L \in \mathbb{R}\right)$.

Assume f is defined on a punctured neighborhood of a. (7 points)

10) Let $f(x) = \begin{cases} \sqrt{x+2}, & x \neq 7 \\ 4, & x = 7 \end{cases}$. (6 points total)

a) What is $\lim_{x \to 7} f(x)$? (3 points)

b) Classify the discontinuity of f at $x = 7$. Box in one: (3 points)

Infinite discontinuity Jump discontinuity Removable discontinuity

11) Let $f(x) = \dfrac{|x-4|}{x-4}$. (9 points total; 3 points each)

a) Find $\lim_{x \to 4^-} f(x)$.

b) Find $\lim_{x \to 4^+} f(x)$.

c) Classify the discontinuity of f at $x = 4$. Box in one:

Infinite discontinuity Jump discontinuity Removable discontinuity

12) Let $f(x) = \dfrac{\sqrt{x-3}}{x-5}$. What is the domain of f ? Write your answer in interval form (the form using parentheses and/or brackets). Note: f is continuous on the domain interval(s). (6 points)

13) (2 points). True or False: If f is a polynomial function on $\mathbb{R}$ such that $f(2) = -7$ and $f(3) = 9$, then there exists a real number c in the interval $[2, 3]$ such that $f(c) = 0$. Box in one: True False