Math 21A
Vogler
Worksheet 1

1.) Use a calculuator to determine the value of $\lim_{x\to 0} \dfrac{10^x - 1}{x}$ to three decimal places. Do not use L'Hopital's rule.

2.) Write the surface area of a sphere as a function of its volume. Use your result to find the surface area of a sphere of volume 9π cubic feet.

3.) Solve the following inequality for x : $x(x-1)^3(x+2)^2 \leq 0$.

4.) Determine the domain and range for each function and sketch (Do this without a graphing calculator, if possible, then check your answer with a calculator.) its graph.

a.) $f(x) = |x-1|$ b.) $f(x) = |x-1| + |x+5|$

c.) $f(x) = \sqrt{x-3}$ d.) $f(x) = x^2 - 3x$

e.) $f(x) = \sqrt{x^2 - 3x}$ f.) $g(x) = 2\sin(\pi x)$

g.) $h(x) = 3 + e^{-2x}$ h.) $g(x) = \dfrac{3}{1+e^{-2x}}$

i.) $g(x) = \ln(x-4)$

5.) Create (define) your own function having the following two properties :

a.) Domain : all x-values ; Range : $-2 \leq y \leq 2$
b.) Domain : all x-values ; Range : $0 \leq y \leq 6$
c.) Domain : all x-values ; Range : $1 < y < 6$ (Hint: problem 4.)h.) might be of use here.)

6.) Determine all constants K so that the $\lim_{x\to -1} f(x)$ exists. Then graph the function(s).

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

7.) Determine the following limits.

b.) $\lim_{x\to -2} \dfrac{3 - \sqrt{7-x}}{x+2}$

b.) $\lim_{x\to 1} \dfrac{x^4 - 1}{x^3 - 1}$

c.) $\lim_{x\to -\infty} \dfrac{x + 100,000}{\sqrt{x^2+4}}$

8.) In class we "guessed" that $\lim_{x\to 1} \dfrac{x^{1/3} - 1}{1 - x^{1/2}} = -\dfrac{2}{3}$. Verify this algebraically.

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The following problem is for recreational purposes only.

9.) Divide the following trapezoid into four (4) identical (size and shape) pieces.