

Math 21A
Vogler
Discussion Sheet I

- 1.) Use a calculator to determine the value of $\lim_{x \rightarrow 0} \frac{10^x - 1}{x}$ 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.) $g(x) = \frac{3}{1 + e^{-2x}}$
 - 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 $\lim_{x \rightarrow -1} f(x)$ 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.) $\lim_{x \rightarrow -2} \frac{3 - \sqrt{7-x}}{x+2}$
 - b.) $\lim_{x \rightarrow 1} \frac{x^4 - 1}{x^3 - 1}$
 - c.) $\lim_{x \rightarrow -\infty} \frac{x + 100,000}{\sqrt{x^2 + 4}}$
- 8.) In class we "guessed" that $\lim_{x \rightarrow 1} \frac{x^{1/3} - 1}{1 - x^{1/2}} = -\frac{2}{3}$. 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.

