

Math 21A
 Kouba
 Challenge Discussion Sheet 1

1.) Determine the domain and range of each function. Sketch the graph of each. Use a graphing calculator if necessary.

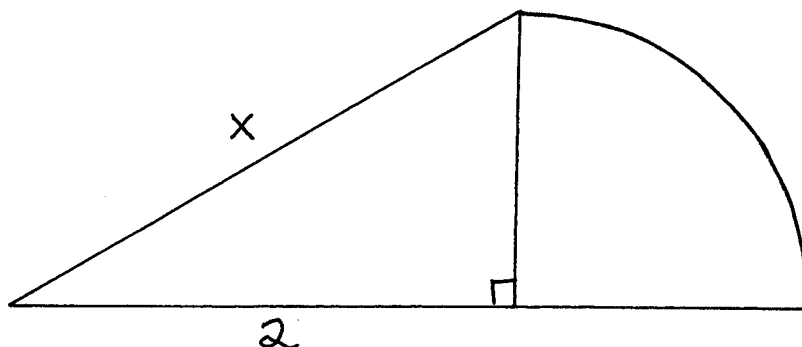
a.) $f(x) = \sqrt{6 - 3x}$ b.) $g(x) = \sqrt{x^2 - 100}$

c.) $y = \ln |2 - x|$ d.) $h(x) = \frac{1}{2 - \ln x}$

e.) $y = -3 \cos^3(x + 2)$ f.) $h(x) = \frac{8}{4 - \sqrt{25 - x^2}}$

2.) Consider the given figure composed of a triangle and a quarter circle. Write

- a.) the quarter circle's area as a function of x .
 b.) the figure's perimeter as a function of x .



3.) Determine the following limits.

a.) $\lim_{x \rightarrow 2} \frac{x^4 - 16}{x^3 - 8}$ b.) $\lim_{x \rightarrow 3} \sin(2\pi/x)$ c.) $\lim_{x \rightarrow 0} \frac{x \tan x}{\sin^2 x}$

d.) $\lim_{x \rightarrow \infty} \arctan\left(\frac{x}{3+x}\right)$ e.) $\lim_{x \rightarrow \infty} (x - \sqrt{x^2 + x})$

f.) $f(x) = \begin{cases} x + 2, & \text{if } x \geq 0 \\ 1 - x, & \text{if } x < 0. \end{cases}$

i.) $\lim_{x \rightarrow 2} f(x)$ ii.) $\lim_{x \rightarrow -1} f(x)$ iii.) $\lim_{x \rightarrow 0^+} f(x)$

iv.) $\lim_{x \rightarrow 0^-} f(x)$ v.) $\lim_{x \rightarrow 0} f(x)$ vi.) $\lim_{x \rightarrow \infty} f(x)$