

Math 21A
Kouba
Discussion Sheet 2

1.) Consider function $f(x) = \frac{1}{x} + 3$. Determine a function $g(x)$ so that

- a.) $f(g(x)) = x^3 + x^2$
- b.) $f(g(x)) = 5f(x)$
- c.) $f(g(x)) = g(x)$

2.) Write the volume of a cube as a function of its surface area. Use your result to find the volume of a cube of surface area 24 square feet.

3.) Determine the domain and range for each function.

- a.) $f(x) = \ln(x^2 - 4)$
- b.) $g(x) = \frac{e^x}{1000 + e^x}$
- c.) $h(x) = \frac{6}{3 - \sqrt{x^2 - 16}}$
- d.) $f(x) = \sqrt{\frac{(x-1)(x-2)}{(x+3)(x+2)}}$

4.) Compute the following limits.

- a.) $\lim_{x \rightarrow \frac{\pi}{4}} \tan x$
- b.) $\lim_{x \rightarrow \frac{\pi}{2}^+} \tan x$
- c.) $\lim_{x \rightarrow 8} \frac{x^{1/3} - 2}{x - 8}$
- d.) $\lim_{x \rightarrow 0^-} \sin(1/x)$
- e.) $\lim_{x \rightarrow -1} \frac{x^2 + 6x + 5}{x^3 + 1}$
- f.) $\lim_{x \rightarrow -\infty} \frac{\sqrt{9x^2 + 16}}{x + 1}$

5.) Use the Intermediate Value Theorem (IMVT) to verify that the following equation is solvable. This is a writing exercise as well as a math exercise. Please be organized, clear, and precise in your writing : $x^3 = 10 + \sqrt{x}$

6.) Determine the radius of the inscribed semi-circle.

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The following problem is for recreational purposes only.

7.) Plant 10 trees in 5 straight rows of four trees each.

