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.) \( \lim_{x \to \frac{\pi}{4}} \tan x \)  
b.) \( \lim_{x \to \frac{\pi}{2}} \tan x \)  
c.) \( \lim_{x \to 8} \frac{x^{1/3} - 2}{x - 8} \)

d.) \( \lim_{x \to 0} \sin(1/x) \)  
e.) \( \lim_{x \to 1} \frac{x^2 + 6x + 5}{x^3 + 1} \)  
f.) \( \lim_{x \to \infty} \frac{\sqrt{9x^2 + 16}}{x + 1} \)

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.