

YOUR NAME: \_\_\_\_\_

George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to **show all your work**. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Find the domain of the function  $f(x) = \sqrt{30 - 5x}$ .

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- (b) Sketch the graph of the piece-wise defined function

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

2. Consider the functions  $f(x) = \frac{1}{2x-1}$  and  $g(x) = \sqrt{x+5}$ .

(a) Give a formula for  $(g \circ f)(x)$ .

(b) Write the two conditions that need to be satisfied by  $x$  so that  $x$  be in the domain of the function  $g \circ f$ . (Do **not** actually compute the domain.)

(c) Find a formula for the inverse function  $f^{-1}(x)$  of the function  $f$ .

3. Consider the piece-wise defined function

$$f(x) = \begin{cases} x + 1, & \text{if } x < 1 \\ 0, & \text{if } x = 1 \\ \log_{\frac{1}{2}} x, & \text{if } x > 1 \end{cases}$$

(a) Graph  $y = f(x)$ .

(b) Compute  $f(1)$ .

(c) Compute  $\lim_{x \rightarrow 1^-} f(x)$ .

(d) Compute  $\lim_{x \rightarrow 1^+} f(x)$ .

4. Compute  $\lim_{x \rightarrow -2} \frac{x^2+5x+6}{x^2-x-6}$

5. Compute  $\lim_{\theta \rightarrow 0} \frac{\cos \theta - 1}{\theta}$ .