

Name: \_\_\_\_\_

4-digit code: \_\_\_\_\_

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has six (6) pages, including this one.
- Enter your answer in the box(es) provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses at the right of the problem number.
- No books, notes or calculators may be used on this test.

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Page	Max. points	Your points
2	20	
3	20	
4	20	
5	30	
6	10	
<b>Total</b>	100	

**Problem 1** (5 pts). Find  $f(3)$  and  $f(\pi)$  for  $f(x) = \begin{cases} \sqrt{x+1} & \text{if } x \geq 1, \\ 3 & \text{if } x < 1. \end{cases}$

$f(3) =$

$f(\pi) =$

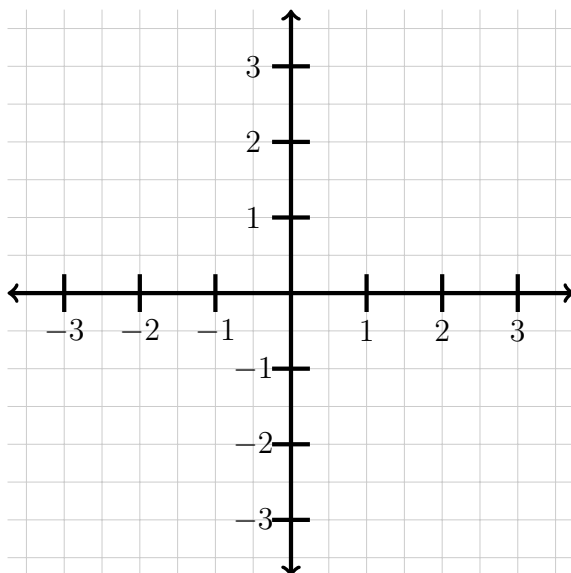
**Problem 2** (10 pts). Find the domain and range of  $f(x) = 2 + \sqrt{x-1}$ .

range =

domain =

**Problem 3** (5 pts). Sketch the graph of the function

$$f(x) = \begin{cases} 3 - \frac{1}{2}x & \text{if } x \leq 2 \\ 2x - 5 & \text{if } x > 2 \end{cases}$$



**Problem 4** (15 pts). Let  $f(x) = x^2 + 3$  and  $g(x) = \sqrt{x}$ . Find  $g \circ f$ ,  $f \circ g$ , and compute the domain of the latter.

$$(g \circ f)(x) =$$

$$(f \circ g)(x) =$$

$$\text{domain of } (f \circ g)(x) =$$

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**Problem 5** (5pts). Find the domain of the function  $f(x) = \frac{1}{1 - e^x}$ .

$$\text{domain} =$$

**Problem 6** (5 pts). Solve for  $x$ :

$$\log(3x) - 3\log(x^{-1/3}) = \log 27.$$

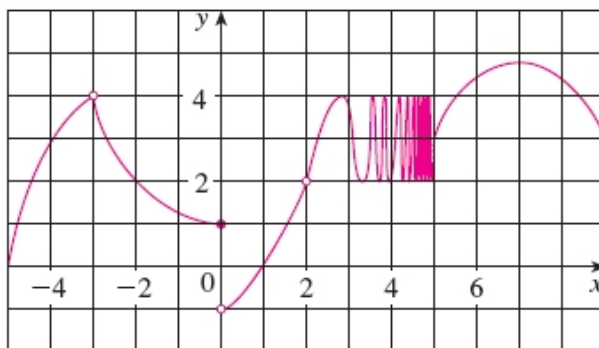
$x =$

**Problem 7** (5 pts). Solve for  $x$ :

$$e^{5-3x} = 10.$$

$x =$

**Problem 8** (10 pts). For the function  $f$  with graph given below, state the value of each quantity, if it exists:



$$\lim_{x \rightarrow -3^-} f(x) = \boxed{\phantom{00}}. \quad \lim_{x \rightarrow 0^+} f(x) = \boxed{\phantom{00}}.$$

$$\lim_{x \rightarrow -3^+} f(x) = \boxed{\phantom{00}}. \quad \lim_{x \rightarrow 0^-} f(x) = \boxed{\phantom{00}}.$$

$$\lim_{x \rightarrow -3} f(x) = \boxed{\phantom{00}}. \quad \lim_{x \rightarrow 0} f(x) = \boxed{\phantom{00}}.$$

**Problem 9** (30 pts). Compute the following limits:

(a)  $\lim_{x \rightarrow 1} \frac{x^2 - 2x - 8}{x^2 - 4} =$

(b)  $\lim_{x \rightarrow 2} \frac{x^2 - 2x - 8}{x^2 - 4} =$

(c)  $\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{2x} =$

**Problem 10** (10 pts). Find the value of the constant  $k$  for which the following function is continuous everywhere:

$$f(x) = \begin{cases} 2k^2x^3 & \text{if } x < 2, \\ x + 32k - 18 & \text{if } x \geq 2. \end{cases}$$

 $k =$