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.

Page	**Max. points**	**Your points**
2	20	
3	20	
4	15	
5	25	
6	20	
Total	100	

Problem 1 (5 pts). Find $f(0)$ and $f(\pi/2)$ for $f(x) = \begin{cases} \sqrt{x+1} & \text{if } x \geq 1, \\ 3 & \text{if } x < 1. \end{cases}$

$f(0) = \boxed{}$

$f(\pi/2) = \boxed{}$

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

domain $= \boxed{}$

Problem 3 (5 pts). Express the function $f(x) = |x-1|$ in piecewise form without using absolute values.

$f(x) = \begin{cases} \boxed{} \end{cases}$

Problem 4 (10 pts)**.** Let $f(x) = x^2 + 4$ and $g(x) = \sqrt{x}$. Find $\big(g \circ f\big)(x)$.

$$\big(g \circ f\big)(x) = \boxed{}$$

Problem 5 (10 pts)**.** How many tangent lines to the curve $y = x/(x+1)$ pass through the point $(0, 0)$.

HINT: *You do not have to compute the equations of the lines.*

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

$$\ln x + \ln(x-1) = 1$$

$x =$ $\boxed{}$

Problem 7 (10 pts)**.** Compute the derivatives of the following functions.

(a) $f(x) = \pi\sqrt{x}(x^4 - 4x^3 + 6x^2 - 4x^1 + 1 - x^{-1})$

$f'(x) =$ $\boxed{}$

(b) $g(t) = \dfrac{t^2 - 5}{t^{-1}}$

$g'(t) =$ $\boxed{}$

Problem 8 (15 pts)**.** Compute the following limits:

(a) $\displaystyle\lim_{x\to 2} \frac{x^2-2x-8}{x^2-4} = \boxed{}$

(b) $\displaystyle\lim_{x\to -\infty} \frac{x^2-2x-8}{x^2-4} = \boxed{}$

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

Problem 9 (10 pts)**.** Find the value of the constant k for which the following function is continuous everywhere:

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

$k = \boxed{}$

Problem 10 (20 pts)**.** Find equations of the tangent lines to the curve

$$y = \frac{x-1}{x+1}$$

that are parallel to the line $x - \frac{9}{2}y = 3$.