Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.

- The test has seven (7) pages, including this one.

- For multi-choice questions, you should circle the answer you select. On the other problems, you should 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	30	
5	10	
6	10	
7	10	
Total	100	

Problem 1 (20 pts). Answer the following questions:

(a) What is the domain of the following function? (justify your answer)

$$f(x) = \frac{x}{\sqrt{x-2}}.$$

　(a) $x < 2$

　(b) $x \le 2$

　(c) $x \ge 2$

　(d) $x > 2$

　(e) $x \ne 2$

(b) Complete the following table (no explanations needed!)

x	-2	-1	0	1	2
$f(x)$	-1	2	0	-2	1
$g(x)$	2	0	-1	2	-1

$(f \circ g)(x)$					

$(g \circ f)(x)$					

Problem 2 (10pts). Find the amplitude and period of

$$y = 3\cos\left(2x + \tfrac{\pi}{2}\right).$$

$$\text{period} = \boxed{}$$

$$\text{Amplitude} = \boxed{}$$

Problem 3 (10 pts). Solve for x:

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

$$x = \boxed{}$$

Problem 4 (30 pts). Compute the following limits:

(a) $\lim\limits_{x \to 2} \dfrac{x^2 - 2x - 8}{x^2 - 4} =$

(b) $\lim\limits_{x \to \infty} \dfrac{x^2 - 2x - 8}{x^2 - 4} =$

(c) $\lim\limits_{x \to \infty} \left(1 + \dfrac{5}{x}\right)^{3x} =$

Problem 5 (10 pts). Recall the "ε–δ" definition of limit:

> We say $\lim\limits_{x \to a} f(x) = b$ if for all $\varepsilon > 0$ there exists $\delta > 0$ such that $|x - a| < \delta$ implies $|f(x) - b| < \varepsilon$.

Use this definition to prove that $\lim\limits_{x \to 4} x^2 - 2x = 8$.

Problem 6 (10 pts). Find the value of the constant k for which the following function is continuous everywhere:

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

$k =$

Problem 7 (10 pts). *Sketch the curve by eliminating the parameter (i.e. try to write $y = f(x)$), and indicate the direction of increasing t*

$$x = \sqrt{t}, \quad y = 2t + 4.$$