

## Math 1120 Calculus Test 1

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June 4, 2001      Name \_\_\_\_\_

The first 9 problems count 6 points for each part and the final 4 count as marked. The total number of points possible is 127.

1. What is the  $y$ -intercept of the line passing through the points  $(4, 7)$  and  $(8, 2)$ ?
2. What is the exact value of  $|2\sqrt{7} - 5| - |7 - 3\sqrt{7}|$ ?
3. Express the value of  $6^9 \cdot 9^6 \cdot 6^6 \cdot 9^9$  in the form  $a^b$ .
4. Consider the function  $f$  defined by:

$$f(x) = \begin{cases} 2x^2 - 7 & \text{if } x < 0 \\ 5x - 1 & \text{if } x \geq 0 \end{cases}$$

Find the slope of the line which goes through the points  $(-2, f(-2))$  and  $(3, f(3))$ .

5. Consider the function  $f$  defined by:

$$f(x) = \begin{cases} -2x + 5 & \text{if } x < 1 \\ 5 & \text{if } x = 1 \\ x^2 + 2 & \text{if } x > 1 \end{cases}$$

Find  $\lim_{x \rightarrow 1} f(x)$ .

6. The expression  $\frac{1}{1 + \sqrt{x}}$  is equivalent to

(A)  $\frac{1 + \sqrt{x}}{1 - x}$     (B)  $\frac{1 + \sqrt{x}}{1 + x}$     (C)  $\frac{1 - \sqrt{x}}{1 - x}$     (D)  $\frac{1 - \sqrt{x}}{1 + x}$     (E)  $1 + x$

7. What is the distance between the point  $(4.5, 10.5)$  and the midpoint of the segment joining the points  $(2, 4)$  and  $(5, 7)$ ?

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8. Suppose the functions  $f$  and  $g$  are given completely by the table of values shown.

$x$	$f(x)$	$x$	$g(x)$
0	2	0	5
1	7	1	7
2	5	2	4
3	1	3	2
4	3	4	6
5	6	5	3
6	0	6	1
7	4	7	0

- (a) What is  $(f \div g)(5 - 1)$ ?  
(b) What is  $f(g(5) + 3)$ ?  
(c) Find a value of  $x$  such that  $g(f(x)) = 6$ .  
(d) What is  $(g \circ f)(g(2) - f(3))$ ?
9. Find the **product** of the two roots of  $6x^2 + 70x - 24 = 0$ .
10. (10 points) Let  $f(x) = x^2 - x$ . Evaluate and simplify  $\frac{f(x+h)-f(x)}{h}$ .
11. (15 points) Let  $f$  and  $g$  be functions defined by  $f(x) = \begin{cases} x^2 - 1 & \text{if } x < 0 \\ 4 - x & \text{if } x \geq 0 \end{cases}$   
and  $g(x) = 2x + 3$ .
- (a) Compute  $f \circ g(-2)$ ,  $f \circ g(-1)$ , and  $f \circ g(0)$   
(b) Find a symbolic representation of  $f \circ g(x)$
12. (20 points) Compute the following limits.
- (a)  $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$   
(b)  $\lim_{x \rightarrow 1} \frac{x - 1}{x^3 - 1}$   
(c)  $\lim_{x \rightarrow 1} 2x^3 \sqrt{2x + 7}$   
(d)  $\lim_{x \rightarrow \infty} \frac{2x^2}{1 + x^2}$
13. (10 points) Describe in English what it means to say that the limit of a function  $f$  is 3 as  $x$  approaches 2. Sketch a graph of a function which has this property but also satisfies  $f(3) = 1$ .