(12) 1. Compute the derivatives of the functions shown. In this problem, you may write only the answers and get full credit. *Please* do not "simplify" the answers!

a) $3+5\sqrt{x}-12x^7$

b) $e^{\left(\frac{2x+1}{3x^2-1}\right)}$

c) $\tan(5x)\,(\cos(x))^3$

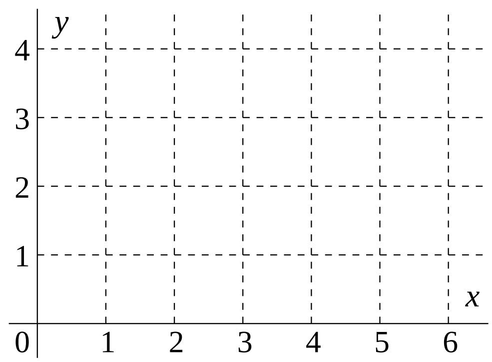
(6) 2. Compute the exact value of the second derivative of $\sin(g(x))$ at $x=2$, assuming that $g(2)=\frac{\pi}{3}$, $g'(2)=5$, and $g''(2)=3$.

(14) 3. a) Use the definition of derivative combined with algebraic manipulation and standard properties of limits to compute the derivative of $f(x)=\sqrt{5-x}$.

Comment Do **NOT** use l'Hôpital's rule.

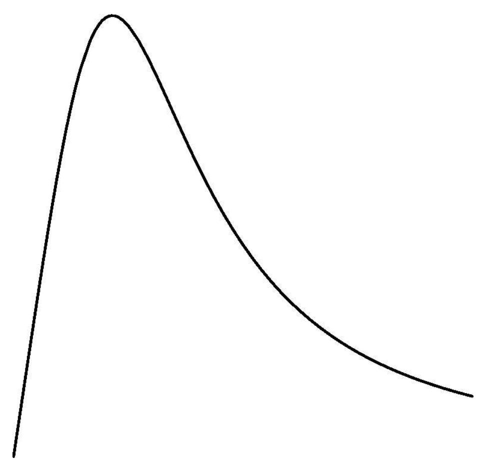
b) Find an equation of the line tangent to $y=\sqrt{5-x}$ when $x=4$. You should use your answer to a). Sketch both this tangent line and $y=\sqrt{5-x}$ on the coordinate axes to the right.

Equation ______________________

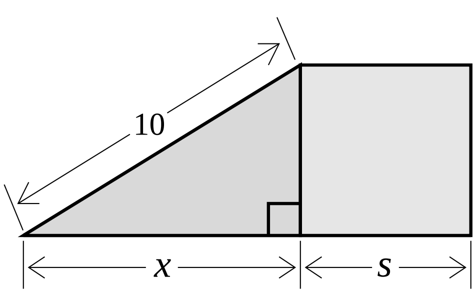


(12) 4. Suppose $f(x)=\dfrac{x}{5+2x^3}$. A portion of a computer-drawn graph of $y=f(x)$ is shown to the right. The coordinate axes were lost in the printing process. Find the exact coordinates of the top of the graph. (Do *not* simplify your answer!)

Coordinates of the top (_______ , _______)



(12) 5. The length of the hypotenuse of a right triangle is 10 inches. One of the legs of the triangle has length x inches. The other leg of the triangle is one side of a square whose interior is outside the triangle. A diagram is shown to the right. Write a formula for $f(x)$, the <u>total area of the triangle and the square</u>, as a function of x. You may begin by finding a formula connecting the side length s of the square to x. What is the domain of this function when used to describe this problem? (The domain should be related to the problem statement.)



(8) 6. Suppose $f(x) = x^3 + 5x^2 + \cos(18x)$. Find a closed interval in which the equation $f(x) = 0$ must have a solution. Give careful evidence supporting your assertion, including *specific results* from Math 151.

Your interval [______ , ______]

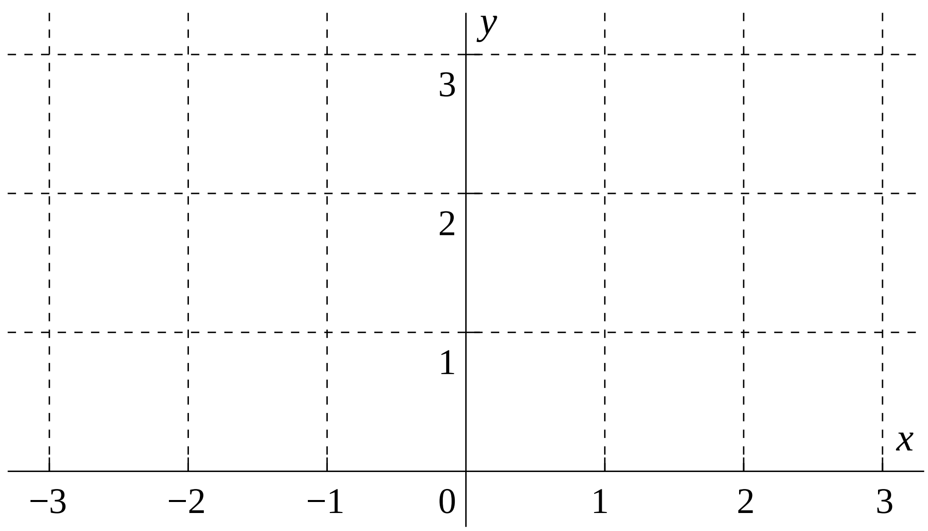
(12) 7. Suppose $f(x) = \begin{cases} 1 + e^x & \text{for } x < 0. \\ Ax + B & \text{for } 0 \le x \le 2. \\ \frac{1}{x} & \text{for } x > 2. \end{cases}$

a) Find values of A and B so that f will be continuous for all x.

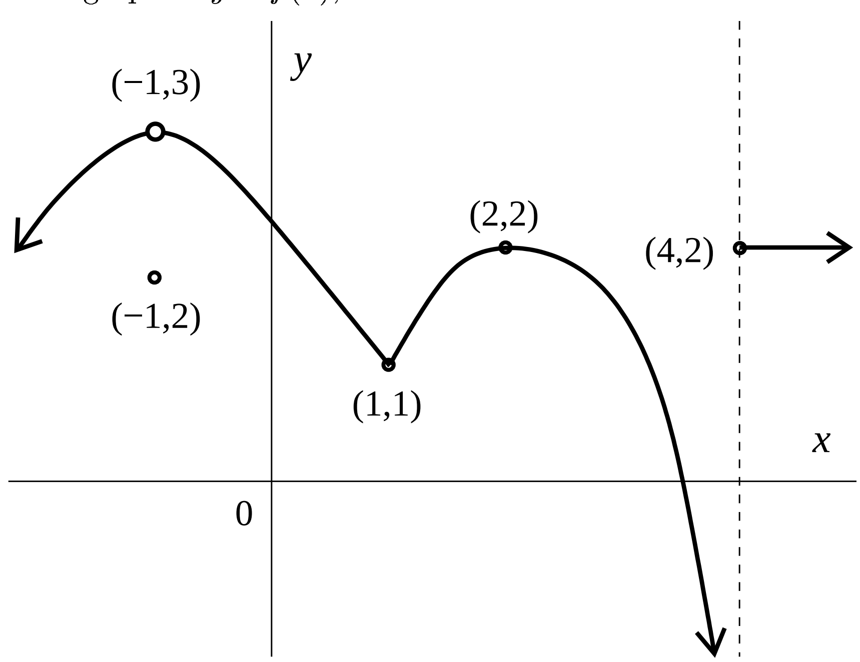
$A =$ ______

$B =$ ______

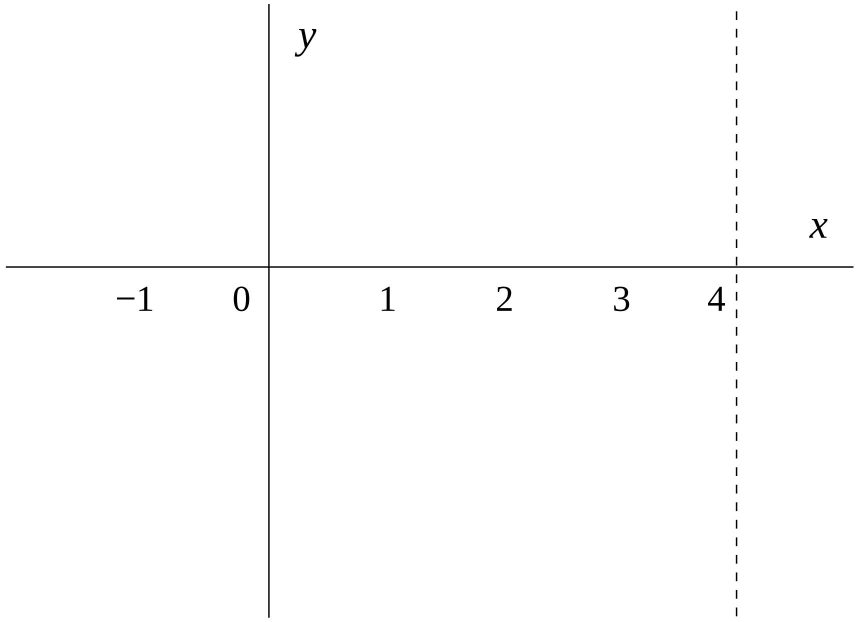
b) Sketch $y = f(x)$ on the axes below using the values of A and B found in a).



(14) 8. Here is part of a graph of $y = f(x)$, a function whose domain is all real numbers.



a) Use these axes to sketch a graph of $y = f'(x)$ as accurately as possible.



b) For which x's can you conclude that f is *not* continuous?

$x =$ __________ and $x =$ __________ .

c) For which x's can you conclude that f is *not* differentiable?

$x =$ __________, $x =$ __________, and $x =$ __________ .

(10) 9. Compute these limits. Supporting work for each answer *must* be given to earn full credit.

Comment For the "experts": do **NOT** use l'Hôpital's rule. Your results should be a specific number, $+\infty$, $-\infty$, or Does Not Exist.

a) $\displaystyle\lim_{x\to 0} \frac{x}{\frac{1}{x+3} + \frac{1}{x-3}}$

b) $\displaystyle\lim_{x\to 2^-} \frac{|x-2|}{x^2-4}$

c) $\displaystyle\lim_{x\to 4} \frac{x-1}{x^2-9}$.

A A

First Exam for Math 151

Sections 7, 8, and 9

October 12, 2007

NAME ____

SECTION __________

Do all problems, in any order.
Show your work. An answer alone may not receive full credit.
No texts, notes, or calculators may be used on this exam.

Problem Number	Possible Points	Points Earned:
1	12	
2	6	
3	14	
4	12	
5	12	
6	8	
7	12	
8	14	
9	10	
Total Points Earned:		

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