Math 122: Test 2

Signature _____

Printed Name _____

Student ID _____

Instructions: Sign and print your name and write your student ID number in the spaces provided above. Read each question below and decide which choice (a, b, c, or d) best answers the question. Circle the letter corresponding to your choice of the best answer. Each problem is worth 7 points. If you choose the correct answer, you will receive 7 points for the problem. If you choose an incorrect answer, you will receive 0 points for the problem. If you leave a problem blank (that is, if you do not circle a letter), then you will receive 7/4 points for the problem. It is up to you to make sure that your choice for an answer or lack thereof is clear. If I have to guess at what you mean (for example, if you circle or leave marks around two letters in the same problem), then you will be given 0 points for the problem.

Caution: Your eyes should stay on your own work. Please take note that the correct answers on the tests near you may differ from your own test paper regardless of the color of the tests.

1. The table below gives values of a function $f(x)$. Which choice gives the best approximation for $f'(4)$?

x	2	4	6	8	10	12
$f(x)$	15.00	17.02	19.04	22.08	26.12	33.02

   (a) 1.01   (b) 2   (c) 2.02   (d) 1.5

2. What is the derivative of $2x^3 - \dfrac{1}{\sqrt{x}}$?

   (a) $6x^2 - \dfrac{1}{2\,x^{3/2}}$ (b) $6x^2 + \dfrac{1}{2\,x^{3/2}}$ (c) $3x^2 - \dfrac{1}{2\,x^{3/2}}$ (d) $6x^2 - \dfrac{1}{x^{3/2}}$

3. Let $C(q)$ be the cost in dollars for producing q items of a certain product. If $C(100) = 12528$ and $C'(100) = 213$, then which of the following is the best approximation for $C(98)$.

   (a) 12954   (b) 12803   (c) 12204   (d) 12102

4. Let $C(q)$ be the cost in dollars for producing q items of a certain product, and let $R(q)$ be the revenue in dollars obtained from selling q items of the product. If $C'(100) = 213$ and $R'(100) = 444$, then what is the approximate profit earned by producing and selling the 101$^{\text{st}}$ item?
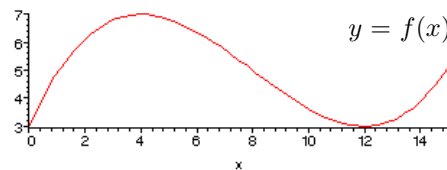
   (a) \$123   (b) \$231   (c) \$323   (d) \$331
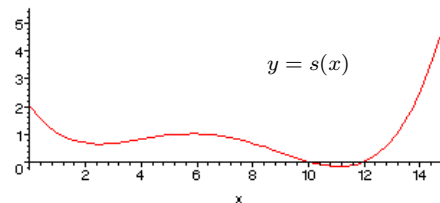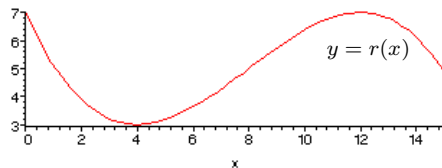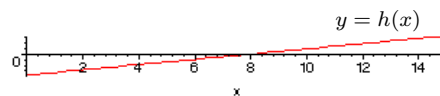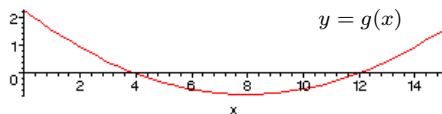
5. Which of the following is *not* true about $y = g(x)$ for $0 \le x \le 14$ as graphed at the top of the page? (Answer (d) if you think (a), (b), and (c) are all true.)

    (a) The function $g''(x)$ is positive.   (b) The derivative of $y = g(x)$ is increasing.

    (c) The graph of $y = g(x)$ is concave up.   (d) One of (a), (b), or (c) is not true.

6. The graph of $y = f(x)$ is given to the right. Which of the functions above approximates the graph of $y = f'(x)$?

    (a) $g(x)$ (b) $h(x)$

   (c) $r(x)$ (d) $s(x)$

7. Given the graph of $y = f(x)$ to the right, which of the functions above approximates the graph of $y = f''(x)$?

    (a) $g(x)$ (b) $h(x)$

    (c) $r(x)$ (d) $s(x)$

8. This question is for the graph $y = f(x)$ shown to the right. The points A and B and the line $\overleftrightarrow{AB}$ are as indicated. Let x_A be the x-coordinate of A, and let x_B be the x-coordinate of B. Also, let m denote the slope of $\overleftrightarrow{AB}$. Which of the inequalities below is correct?

    (a) $m < f'(x_A) < f'(x_B)$ (b) $f'(x_A) < m < f'(x_B)$

   (c) $f'(x_B) < m < f'(x_A)$ (d) $f'(x_B) < f'(x_A) < m$
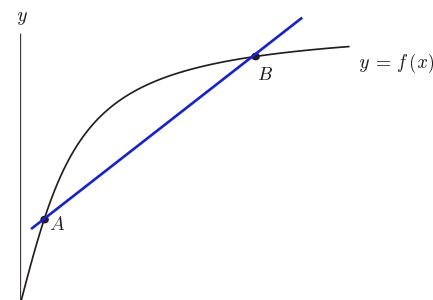
9. A man starts driving a car away from home at 8:00 a.m. on March 3, 2003. If $s(t) = 4t^2 + t$ denotes the distance in miles the car is away from home t hours after 8:00 a.m. on March 3, 2003, then what is the instantaneous velocity of the car at noon on March 3, 2003?

    (a) 54 m.p.h.   (b) 42 m.p.h.   (c) 40 m.p.h.   (d) 33 m.p.h.

10. If your teacher's weight in pounds is given by $W(t)$ where t denotes his age (in years), then what are the units associated with $W'(t)$?

    (a) years per pound   (b) years per weight   (c) pounds per year   (d) tons per minute
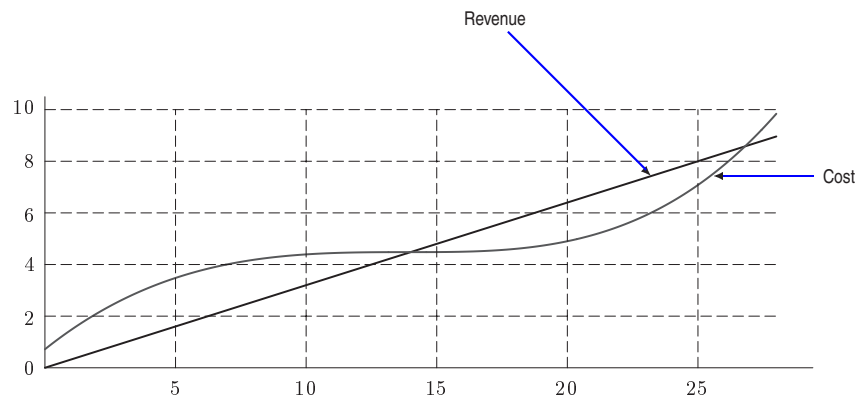
11. The graph above shows a cost function $C(q)$ and a revenue function $R(q)$ associated with producing a quantity q of a certain item. For what quantity q is the profit maximized?

   (a) 5   (b) 14   (c) 21   (d) 27

12. The graph above shows a cost function $C(q)$ and a revenue function $R(q)$ associated with producing a quantity q of a certain item. For what quantity q below is $C'(q) = R'(q)$?

   (a) 4.25   (b) 21   (c) 14   (d) 25

13. Which of the following is an equation for the tangent line to the graph of $y = x^4 - 2x^3$ at the point on the graph where $x = 1$?

   (a) $y = -2x - 1$ (b) $y = 2x - 1$ (c) $y = 2x - 3$ (d) $y = -2x + 1$

14. The table below gives values of a function $f(t)$. Based on these values, which of the following inequalities holds for $f'(t)$ and $f''(t)$ whenever $0 \leq t \leq 10$?

t	0	2	4	6	8	10
$f(t)$	20	32	42	50	56	60

   (a) $f''(t) < 0 < f'(t)$ (b) $f'(t) < f''(t) < 0$ (c) $0 < f'(t) < f''(t)$ (d) $0 < f''(t) < f'(t)$