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

<table>
<thead>
<tr>
<th>( x )</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>15.00</td>
<td>17.02</td>
<td>19.04</td>
<td>22.08</td>
<td>26.12</td>
<td>33.02</td>
</tr>
</tbody>
</table>

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

2. What is the derivative of \( 2x^3 - \frac{1}{\sqrt{x}} \)?

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

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 101st item?

(a) $123   
(b) $231   
(c) $323   
(d) $331
5. Which of the following is not true about \( y = g(x) \) for \( 0 \leq x \leq 14 \) 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 \( AB \) 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 \( AB \). 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 \( 0 \leq t \leq 10 \)?

<table>
<thead>
<tr>
<th>( t )</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(t) )</td>
<td>20</td>
<td>32</td>
<td>42</td>
<td>50</td>
<td>56</td>
<td>60</td>
</tr>
</tbody>
</table>

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