TEST 2 PROBLEMS

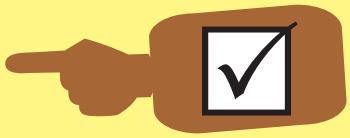
1. The table below gives values of a function $f(x)$. Which choice gives the best approximation for $f'(4)$?

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

(a) $\mathbf{1.01}$
(b) $\mathbf{2}$
(c) $\mathbf{2.02}$
(d) $\mathbf{1.5}$

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) $\mathbf{1.01}$ 

(b) $\mathbf{2}$

(c) $\mathbf{2.02}$

(d) $\mathbf{1.5}$

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

(a) $6x^2 - \frac{1}{2\,x^{3/2}}$

(b) $6x^2 + \frac{1}{2\,x^{3/2}}$

(c) $3x^2 - \frac{1}{2\,x^{3/2}}$

(d) $6x^2 - \frac{1}{x^{3/2}}$

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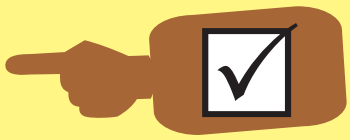
(b) $6x^2 + \frac{1}{2\,x^{3/2}}$ 

(c) $3x^2 - \frac{1}{2\,x^{3/2}}$

(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

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
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(c) 12204
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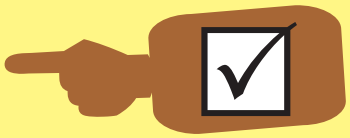

4. Let $C(q)$ be the cost in dollars for producing q items of a certain product, and let $R(q)$ be the revenue in dollars obtained from selling q items of the product. If $C'(100) = 213$ and $R'(100) = 444$, then what is the approximate profit earned by producing and selling the 101^{st} item?

   (a) $\$123$

   (b) $\$231$

   (c) $\$323$

   (d) $\$331$

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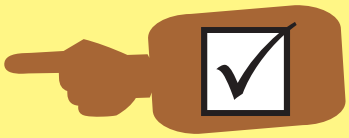
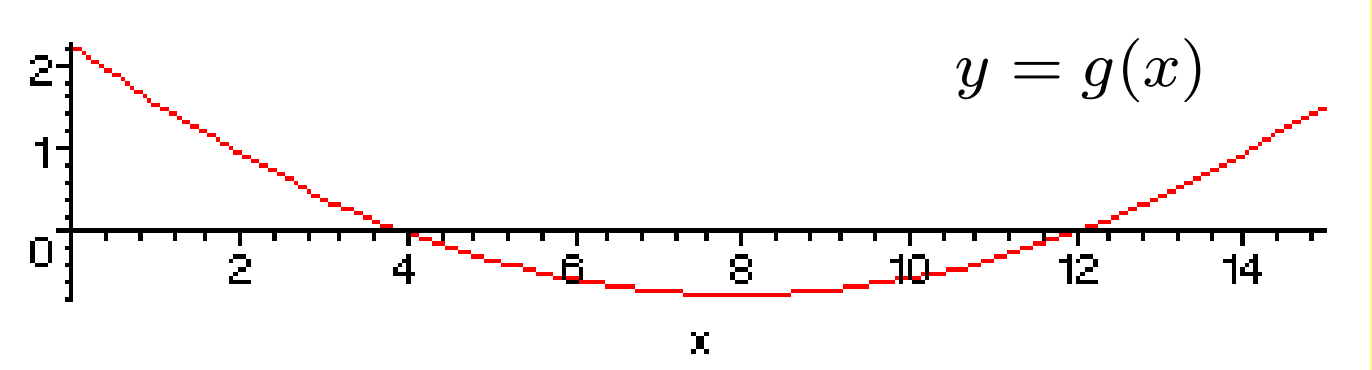
(b) $\$231$ 

(c) $\$323$

(d) $\$331$



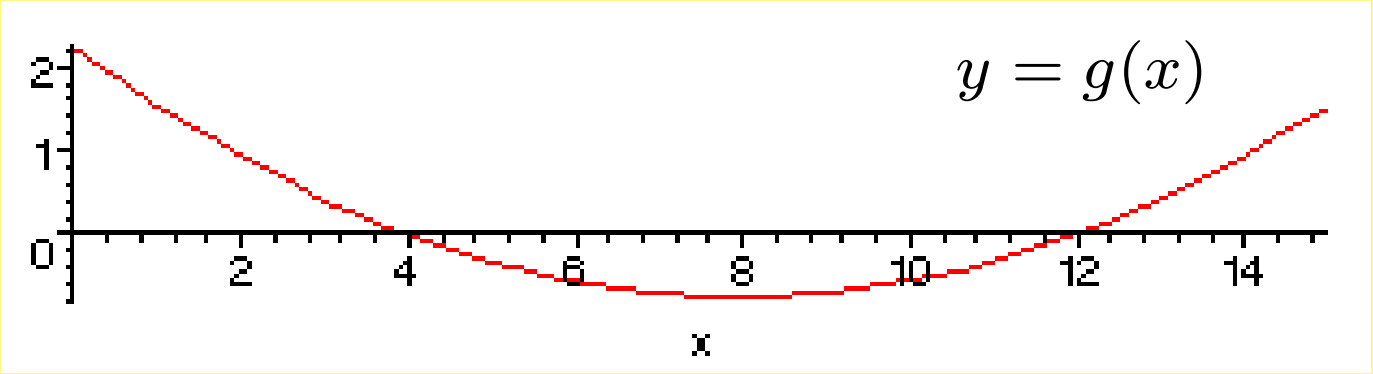
5. Which of the following is *not* true about $y = g(x)$ for $0 \leq x \leq 14$ as graphed at the top of the page? (Answer (d) if you think (a), (b), and (c) are all true.)

   (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.



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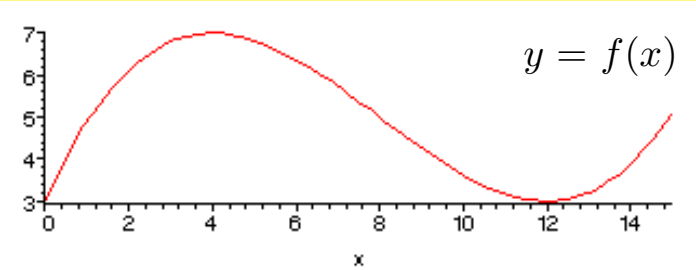
6. The graph of $y = f(x)$ is given to the right. Which of the functions above approximates the graph of $y = f'(x)$?



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

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

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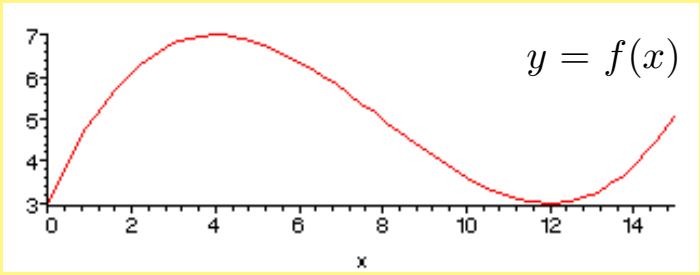
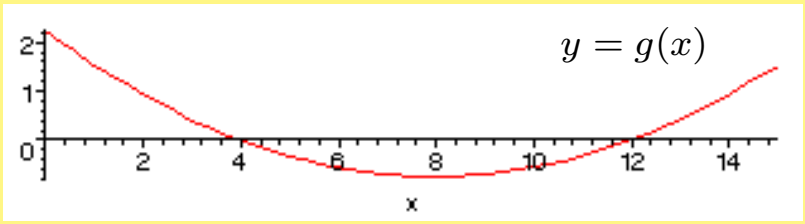
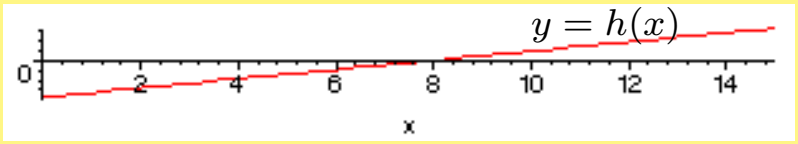
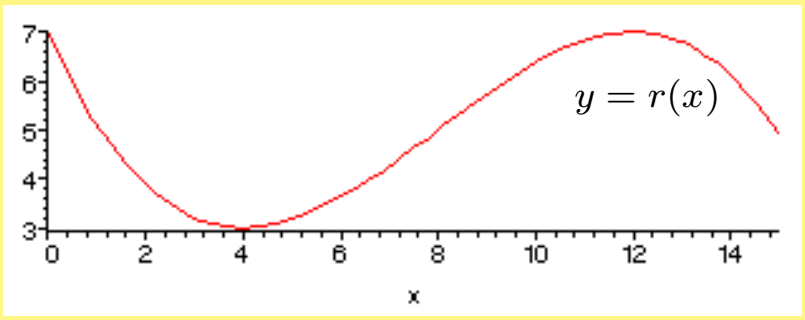
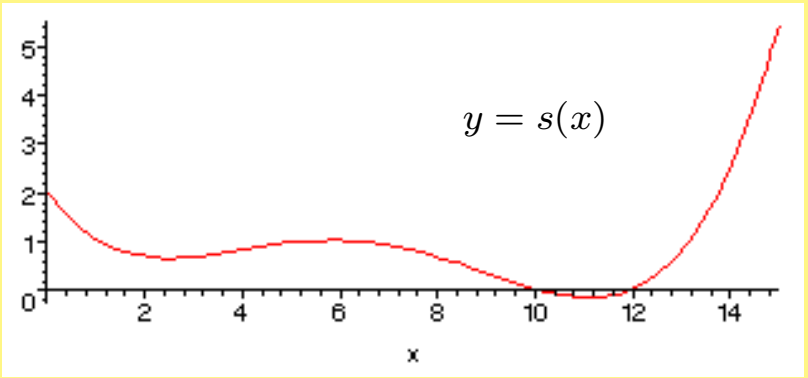


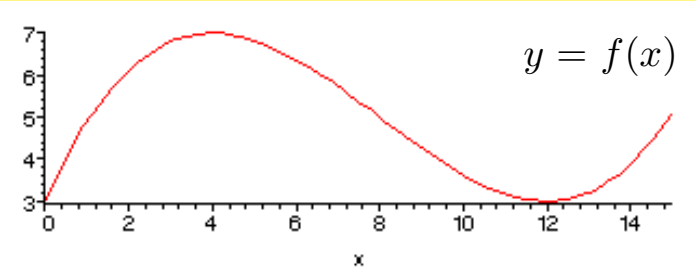








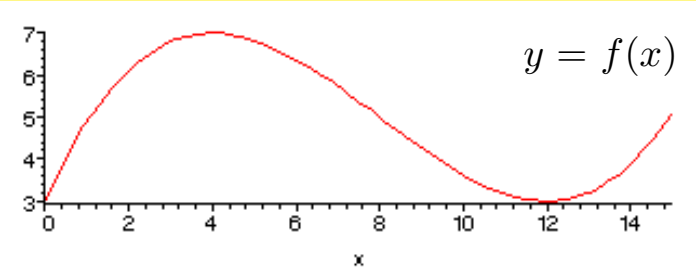
6. The graph of $y = f(x)$ is given to the right. Which of the functions approximates the graph of $y = f'(x)$?



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

(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 $y = f''(x)$?



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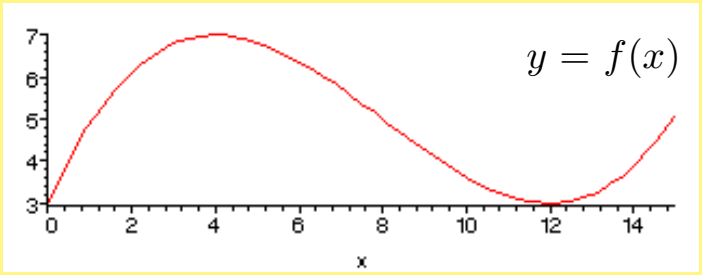

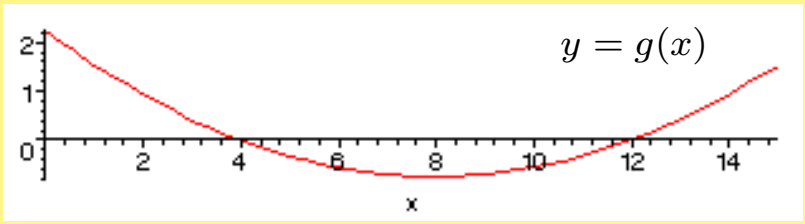

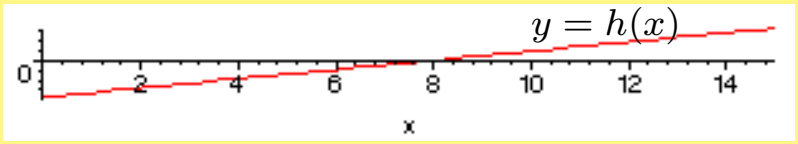

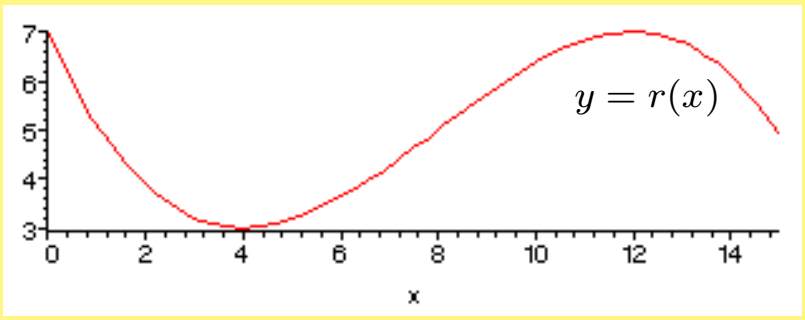

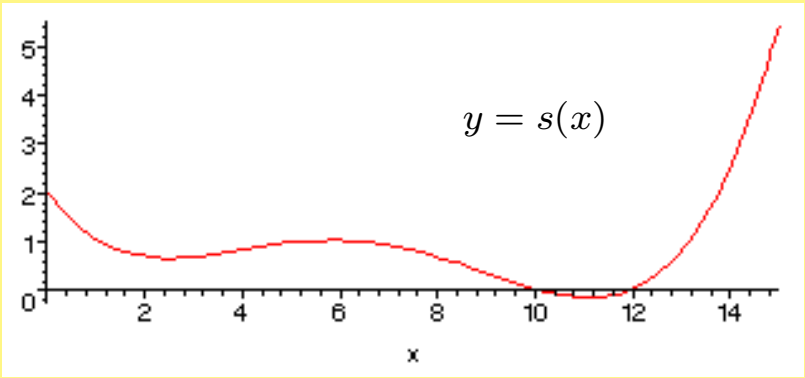

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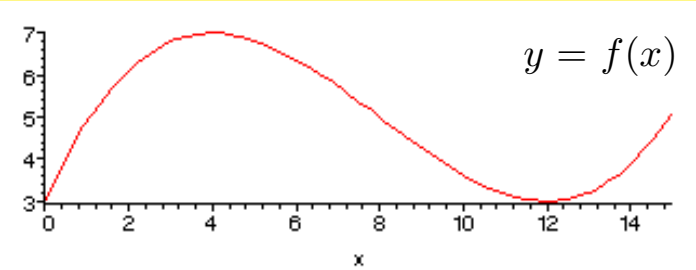
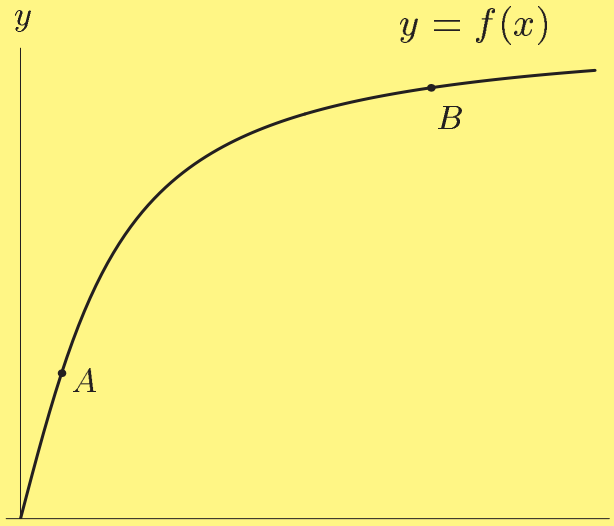


(a) $g(x)$ (b) $h(x)$ ☑

(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?



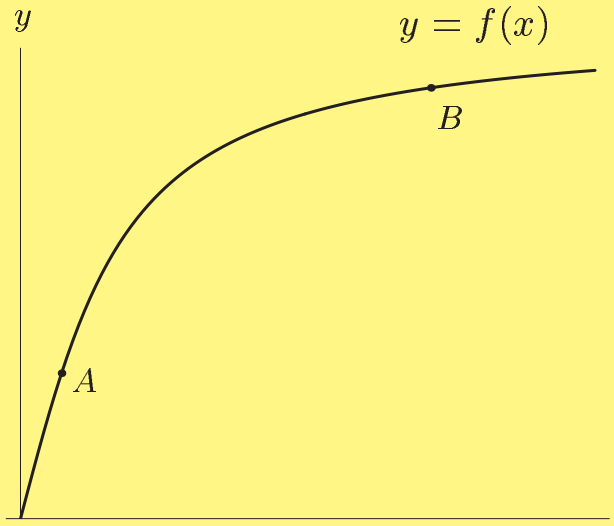
(a) $m < f'(x_A) < f'(x_B)$

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

(c) $f'(x_B) < m < f'(x_A)$

(d) $f'(x_B) < f'(x_A) < m$

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?



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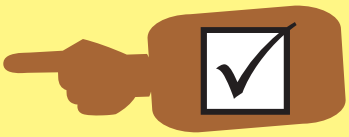
(d) $f'(x_B) < f'(x_A) < m$



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.

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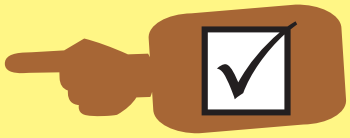
(d) 33 m.p.h. 

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

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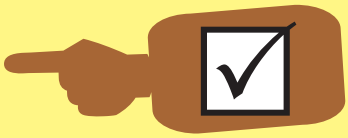
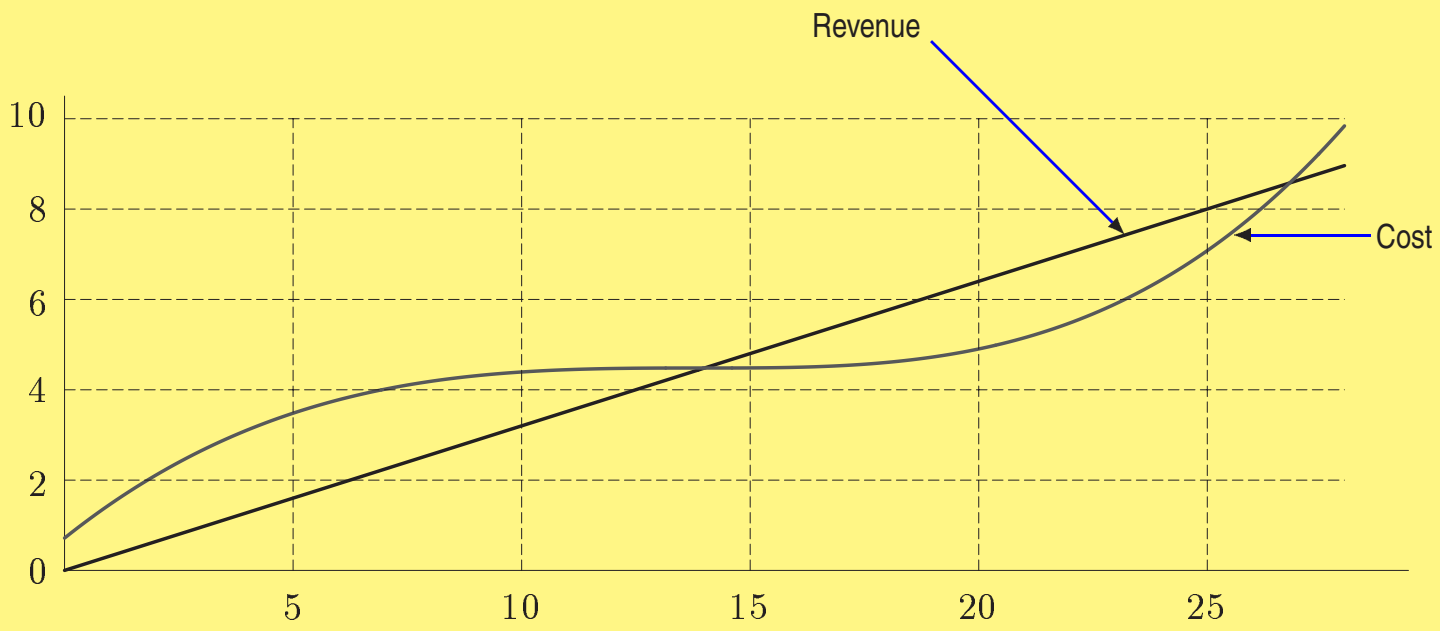
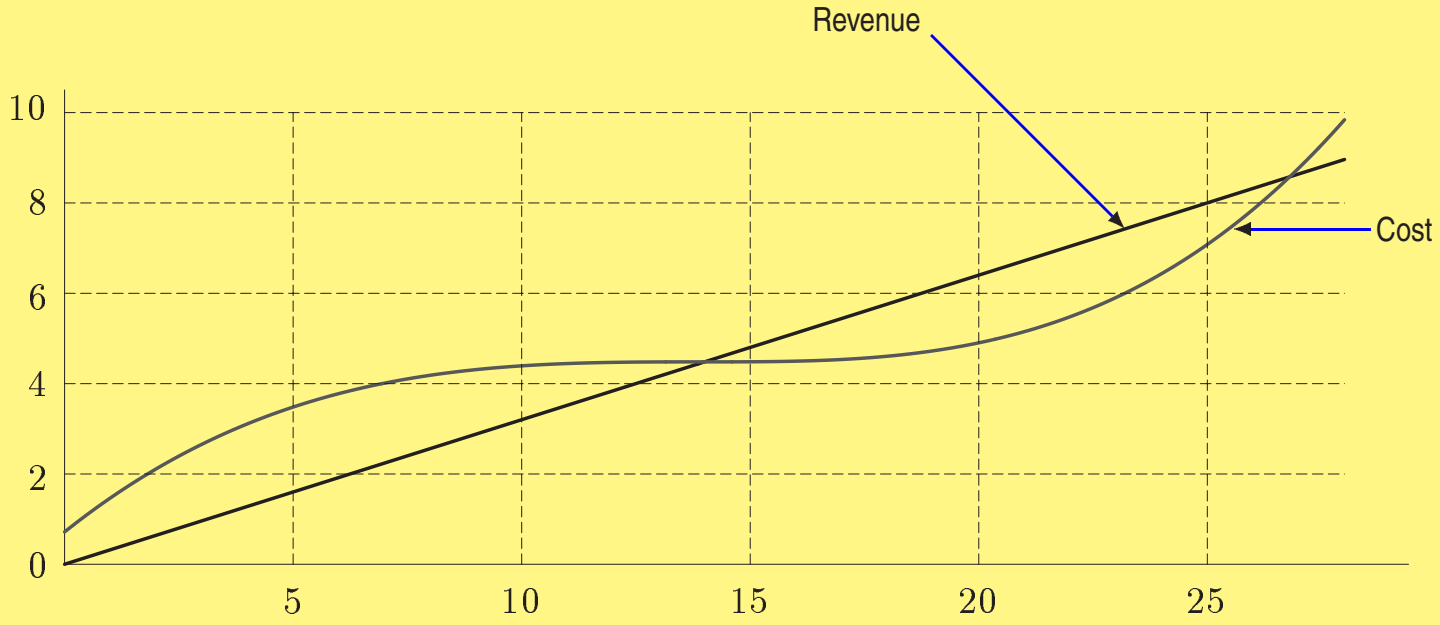
(c) pounds per year 

(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) $\mathbf{5}$ (b) $\mathbf{14}$ (c) $\mathbf{21}$ (d) $\mathbf{27}$



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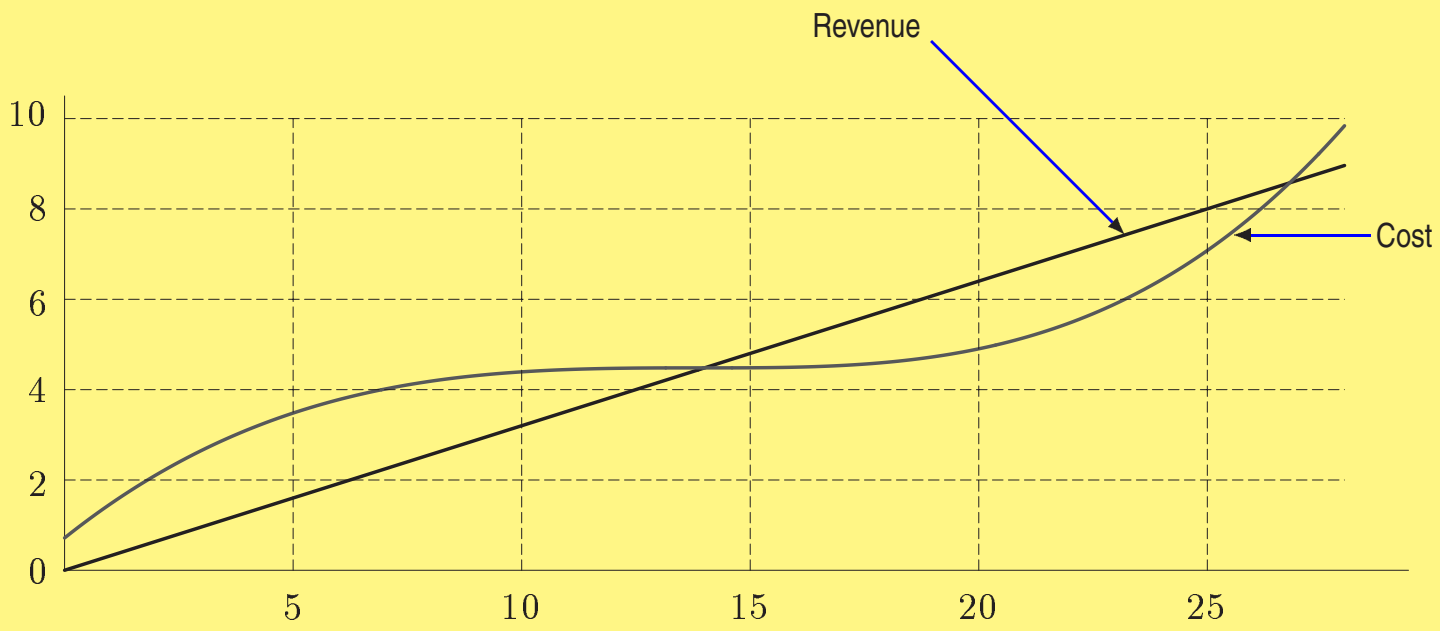
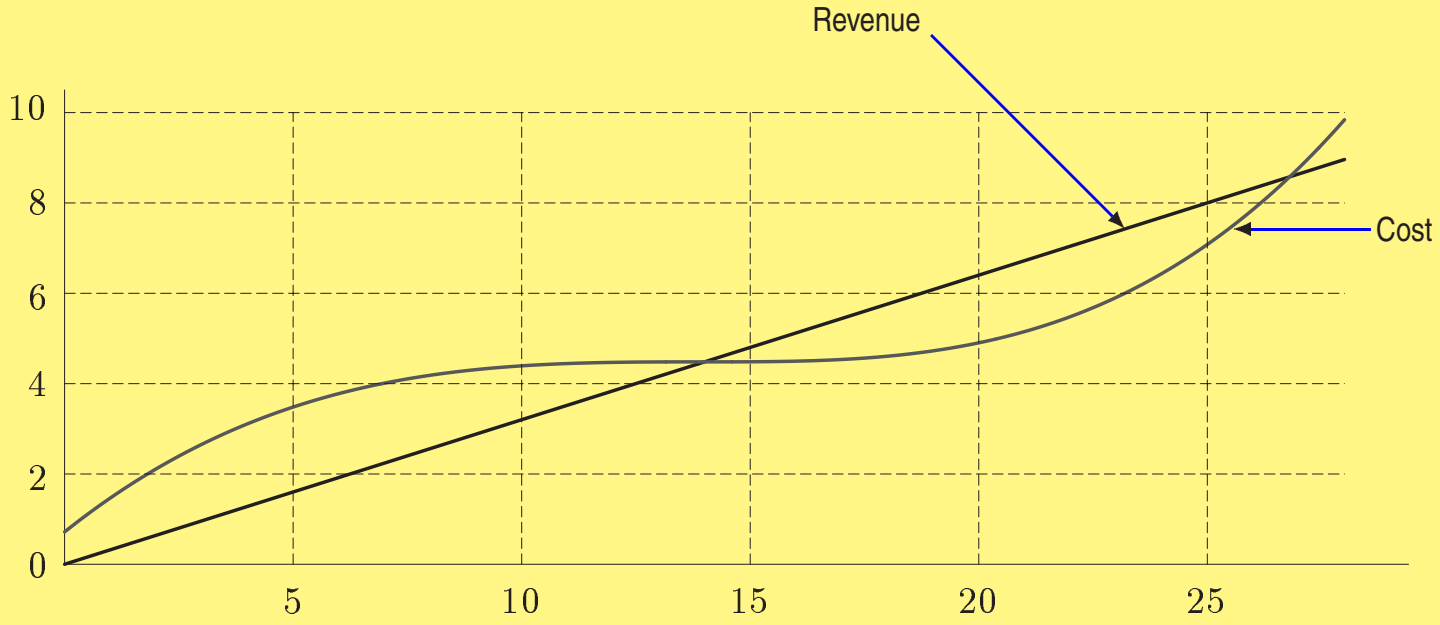


12. The graph above shows a cost function $C(q)$ and a revenue function $R(q)$ associated with producing a quantity q of a certain item. For what quantity q below is $C'(q) = R'(q)$?

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



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(a) 4.25 (b) 21 (c) 4 (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) $y = -2x + 1$

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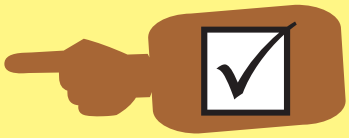
(d) $y = -2x + 1$ 

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) $0 < f''(t) < f'(t)$

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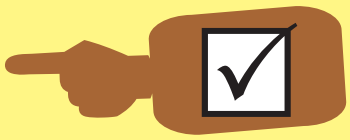
$f(t)$	20	32	42	50	56	60

(a) $f''(t) < 0 < f'(t)$ 

(b) $f'(t) < f''(t) < 0$

(c) $0 < f'(t) < f''(t)$

(d) $0 < f''(t) < f'(t)$