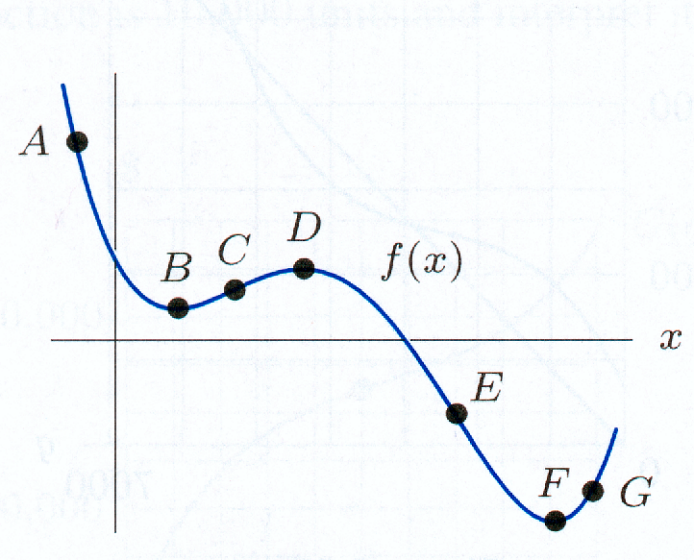
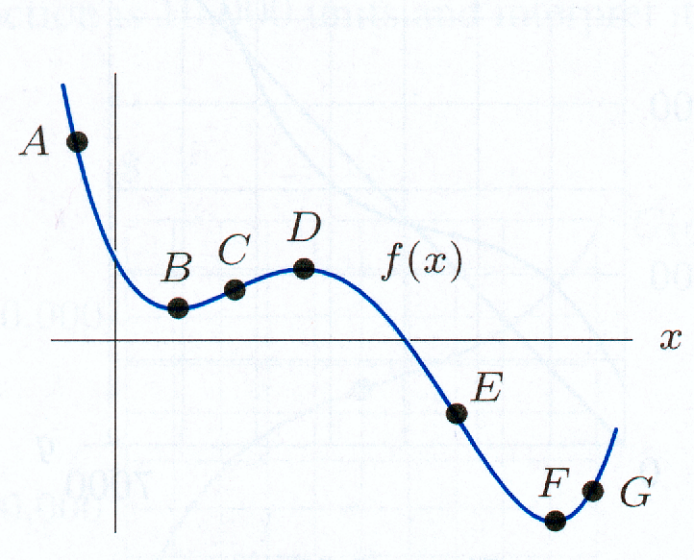
MATH 122: TEST 2 REVIEW

Problem 2:



Problem 2:



Where is $f'(x)$ positive?

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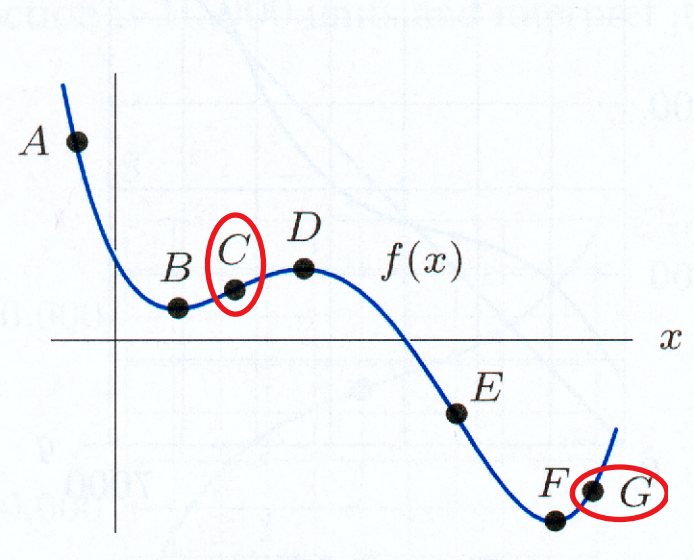

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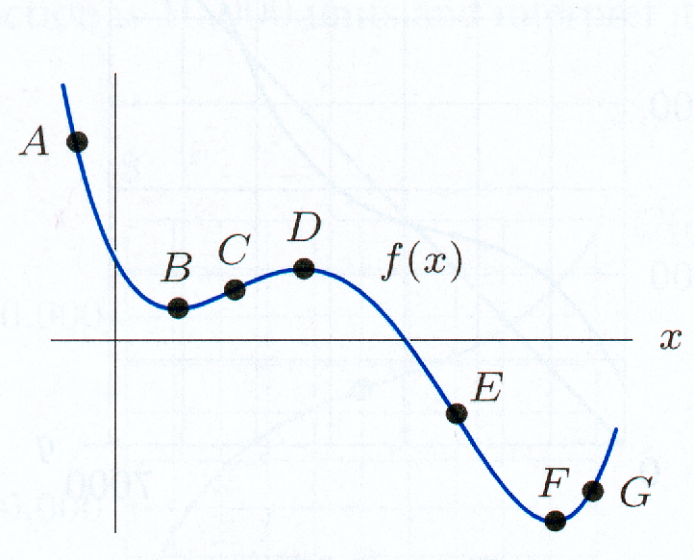

Where is $f'(x)$ negative?

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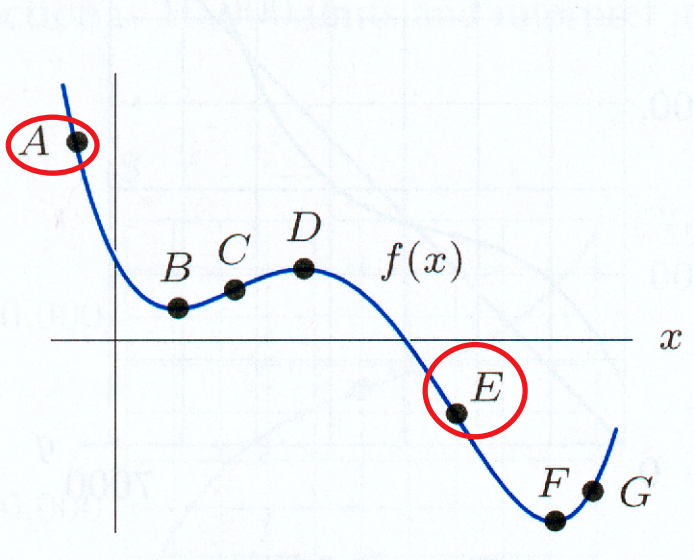

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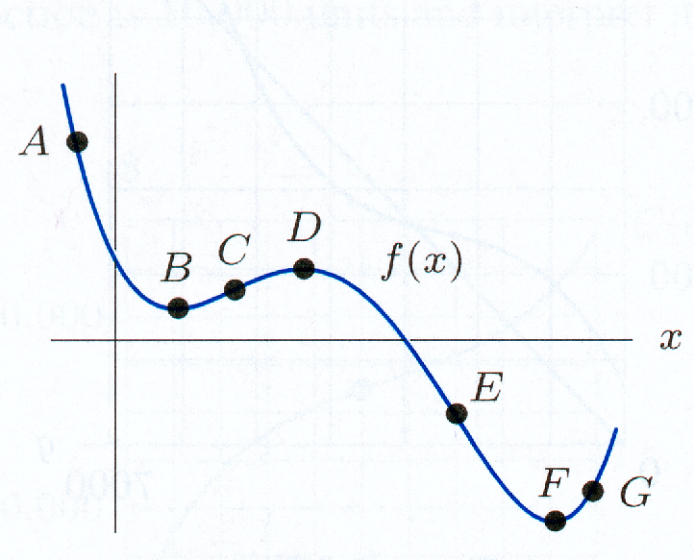

Where is $f'(x)$ zero?

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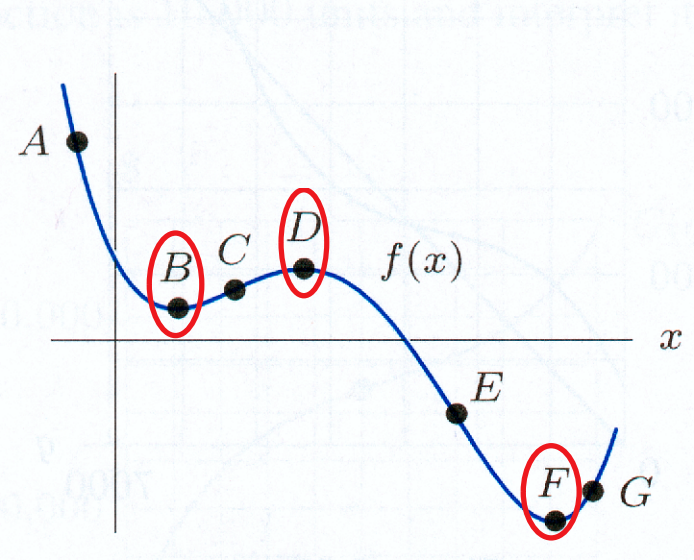

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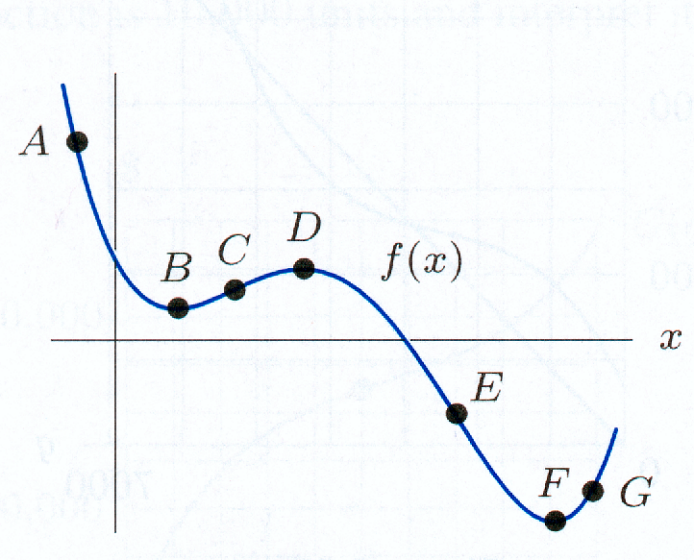

Where is $f'(x)$ largest?

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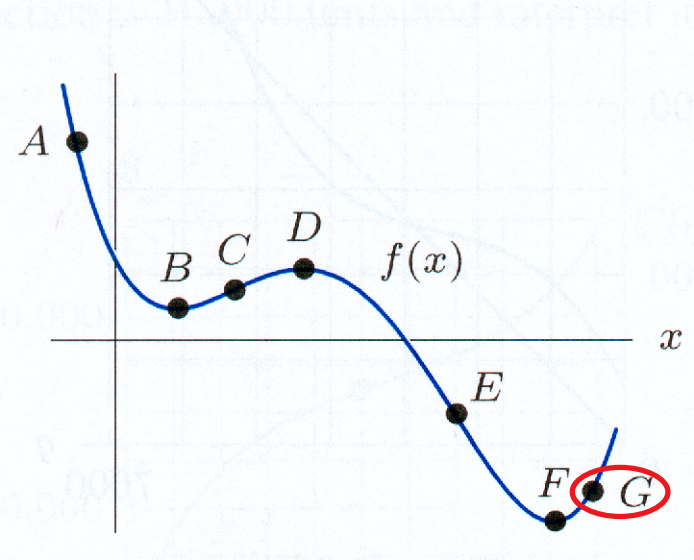

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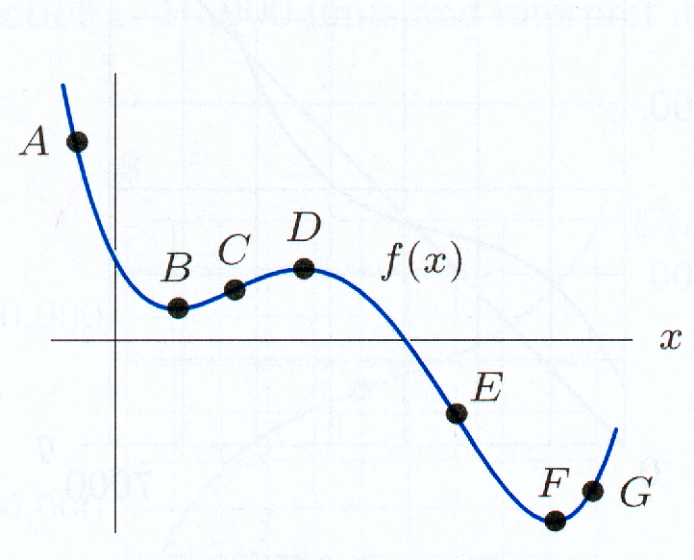
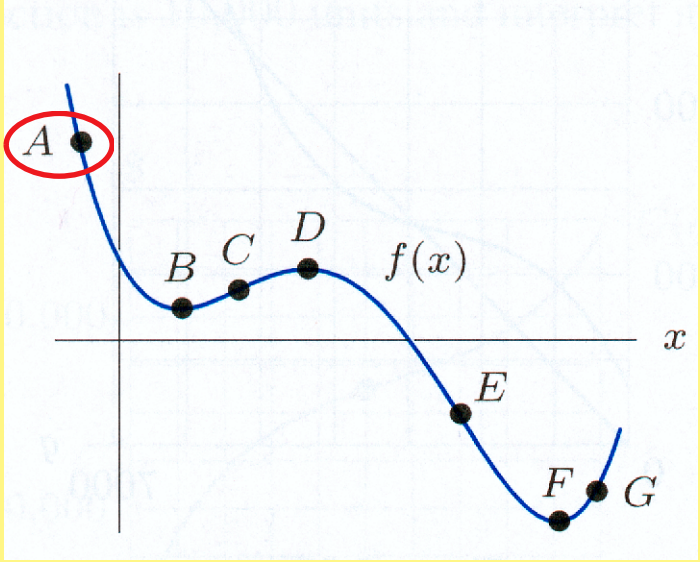


Where is $f'(x)$ the most negative?

Problem 2:



Where is $f'(x)$ the most negative?

Problem 4:

t	0	2	4	6	8	10
$f(t)$	150	145	137	122	98	56

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$$145 - 150 = -5, \quad 137 - 145 = -8, \ \ldots$$

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$$-8 - (-5) = -3 \qquad -15 - (-8) = -7$$

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Estimate $f'(2)$.

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$$f'(2) \approx \frac{137 - 145}{4 - 2}$$

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$f(t)$	150	145	137	122	98	56

Estimate $f'(2)$.

$$f'(2) \approx \frac{137 - 145}{4 - 2} = \frac{-8}{2} = -4$$

Problem 4:

t	0	2	4	6	8	10
$f(t)$	150	145	137	122	98	56

Estimate $f'(2)$.

$$f'(2) \approx \frac{145 - 150}{2 - 0} = \frac{-5}{2} = -2.5$$

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t	0	2	4	6	8	10
$f(t)$	150	145	137	122	98	56

Estimate $f'(8)$.

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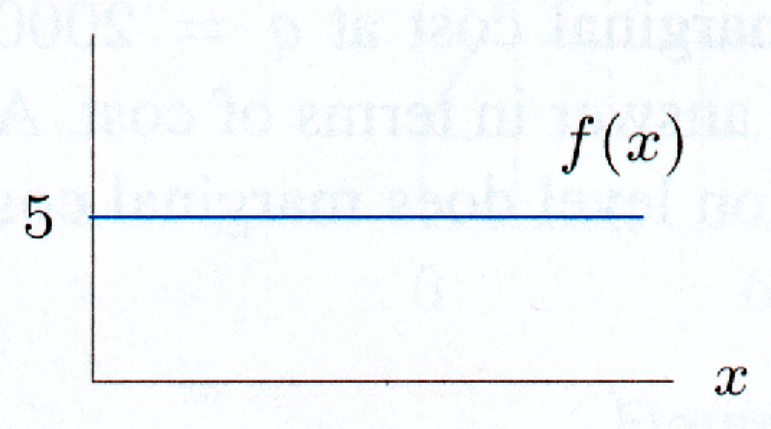
t	0	2	4	6	8	10
$f(t)$	150	145	137	122	98	56

Estimate $f'(8)$.

$$f'(8) \approx \frac{56 - 98}{10 - 8} = \frac{-42}{2} = -21$$

Problem 7:



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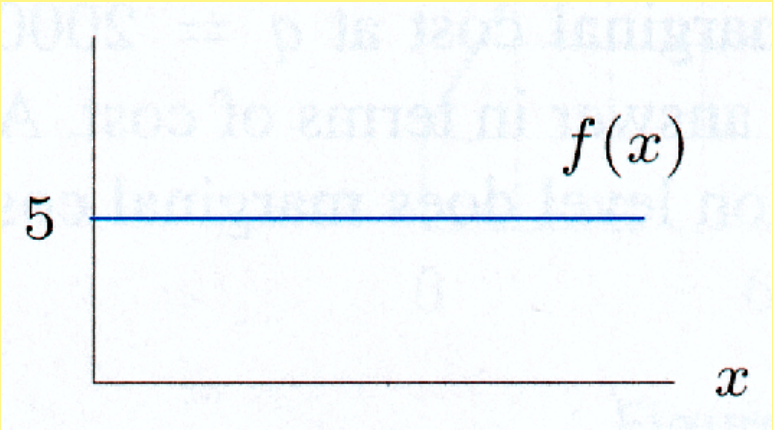

Sketch the graph of the derivative of the function.

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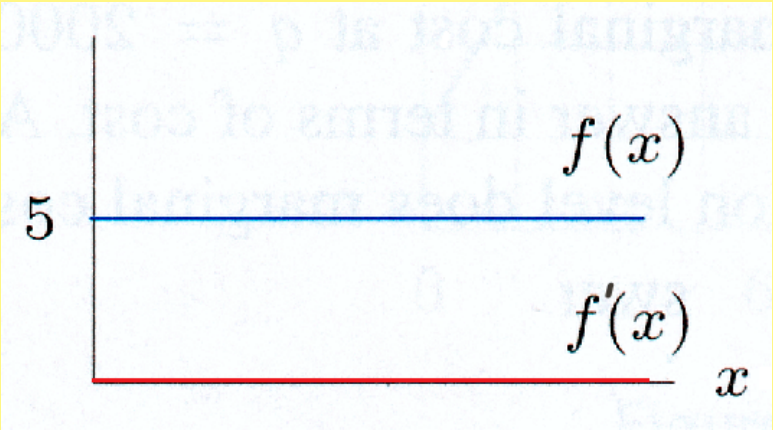

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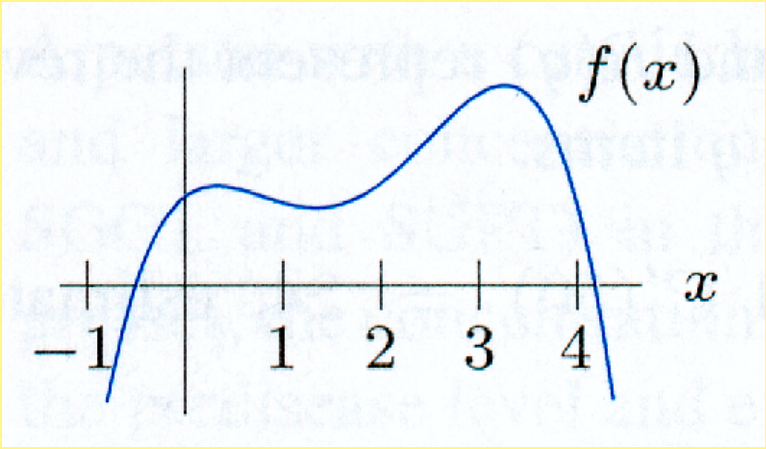

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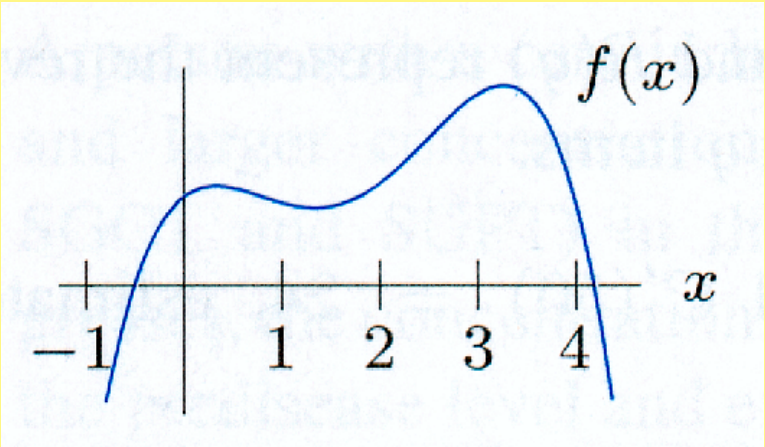

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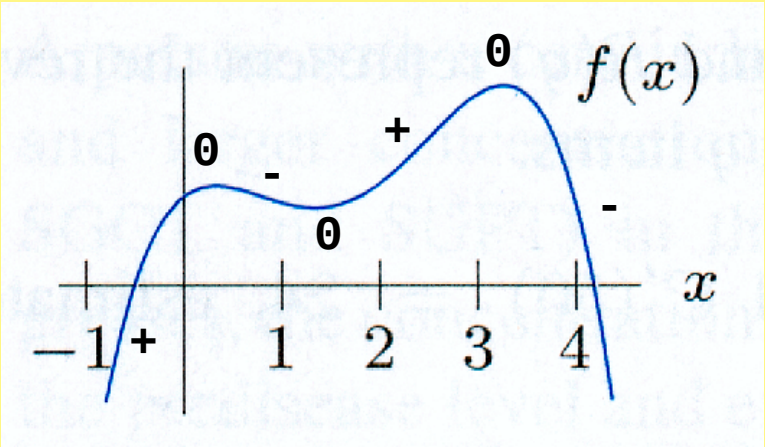

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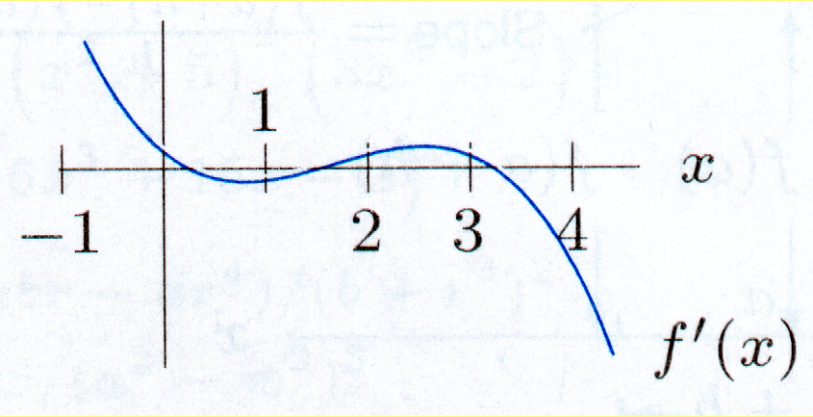
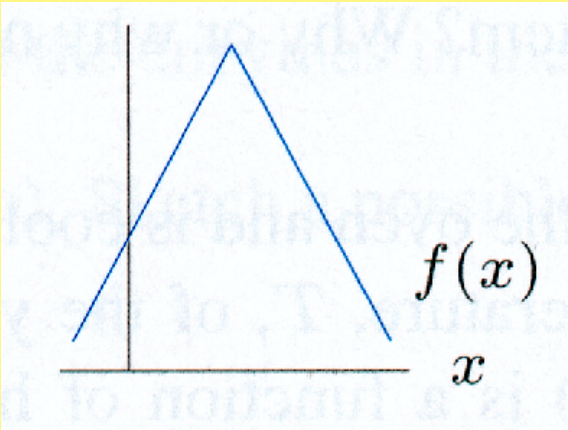


Sketch the graph of the derivative of the function.

Problem 11:



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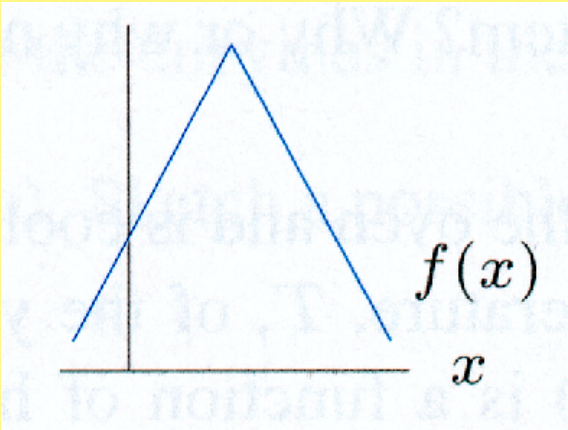

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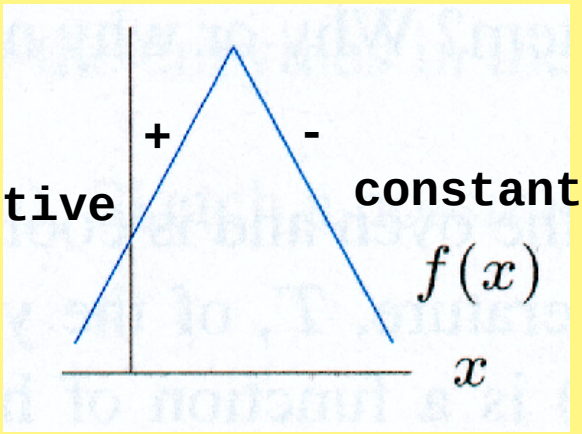
Problem 11:

constant derivative



constant derivative

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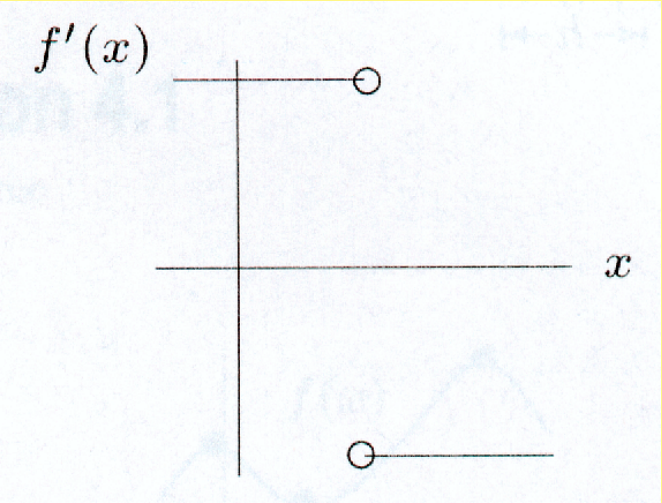
Problem 11:



Sketch the graph of the derivative of the function.

Problem 13:

$$f(20) = 68 \qquad f'(20) = -3$$

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$$f(21) \approx \, ?$$

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$$f(25) \approx 68 - 3 \cdot 5 = \mathbf{53}$$

Problem 16:

t (year)	1987	1990	1993	1996	1999
G (million troy ounces)	53	70	73	74	81

$G = f(t)$ (amount of gold produced)

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Is $f'(t)$ positive or negative? What does this mean?

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Is $f'(t)$ positive or negative? What does this mean?

Positive

Problem 16:

t (year)	1987	1990	1993	1996	1999
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$G = f(t)$ (amount of gold produced)

Is $f'(t)$ positive or negative? What does this mean?

Positive, so gold production is increasing.

Problem 16:

t (year)	1987	1990	1993	1996	1999
G (million troy ounces)	53	70	73	74	81

$G = f(t)$ (amount of gold produced)

When does $f'(t)$ appear greatest?

Problem 16:

t (year)	1987	1990	1993	1996	1999
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$G = f(t)$ (amount of gold produced)

When does $f'(t)$ appear greatest?

From 1987 to 1990.

Problem 16:

t (year)	1987	1990	1993	1996	1999
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$G = f(t)$ (amount of gold produced)

Estimate $f'(1999)$? What does it mean?

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t (year)	1987	1990	1993	1996	1999
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Estimate $f'(1999)$? What does it mean?

$f'(1999) \approx$

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Estimate $f'(1999)$? What does it mean?

$$f'(1999) \approx \frac{81 - 74}{1999 - 1996}$$

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$G = f(t)$ (amount of gold produced)

Estimate $f'(1999)$? What does it mean?

$$f'(1999) \approx \frac{81 - 74}{1999 - 1996} = \frac{7}{3}$$

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$G = f(t)$ (amount of gold produced)

Estimate $f'(1999)$? What does it mean?

$$f'(1999) \approx \frac{81 - 74}{1999 - 1996} = \frac{7}{3} = 2.333\ldots$$

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t (year)	1987	1990	1993	1996	1999
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$G = f(t)$ (amount of gold produced)

$f'(1999) \approx 2.33$

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t (year)	1987	1990	1993	1996	1999
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$G = f(t)$ (amount of gold produced)

$f'(1999) \approx \mathbf{2.33}$ million troy ounces of gold per year

Problem 16:

t (year)	1987	1990	1993	1996	1999
G (million troy ounces)	53	70	73	74	81

$G = f(t)$ (amount of gold produced)

$f'(1999) \approx 2.33$ million troy ounces of gold per year

About 2.33 million troy ounces more gold were produced in 2000 than in 1999.

Problem 16:

t (year)	1987	1990	1993	1996	1999
G (million troy ounces)	53	70	73	74	81

$G = f(t)$ (amount of gold produced)

$f'(1999) \approx 2.33$ Estimate $f(2000)$ and $f(2005)$.

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t (year)	1987	1990	1993	1996	1999
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$f(2000) \approx$

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$G = f(t)$ (amount of gold produced)

$f'(1999) \approx 2.33$ Estimate $f(2000)$ and $f(2005)$.

$$f(2000) \approx 81 + 2.33$$

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$$f(2000) \approx 81 + 2.33 = 83.33$$

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$G = f(t)$ (amount of gold produced)

$f'(1999) \approx 2.33$ Estimate $f(2000)$ and $f(2005)$.

$$f(2000) \approx 81 + 2.33 = 83.33$$

About 83.33 million troy oz of gold were produced in 2000.

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$f(2005) \approx$

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$G = f(t)$ (amount of gold produced)

$f'(1999) \approx 2.33$ Estimate $f(2000)$ and $f(2005)$.

$$f(2005) \approx 81 + 2.33 \cdot 6$$

Problem 16:

t (year)	1987	1990	1993	1996	1999
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$G = f(t)$ (amount of gold produced)

$f'(1999) \approx 2.33$ Estimate $f(2000)$ and $f(2005)$.

$$f(2005) \approx 81 + 2.33 \cdot 6 \approx 95$$

Problem 16:

t (year)	1987	1990	1993	1996	1999
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$G = f(t)$ (amount of gold produced)

$f'(1999) \approx 2.33$ Estimate $f(2000)$ and $f(2005)$.

$$f(2005) \approx 81 + 2.33 \cdot 6 \approx 95$$

About 95 million troy oz of gold were produced in 2005.

Problem 21:

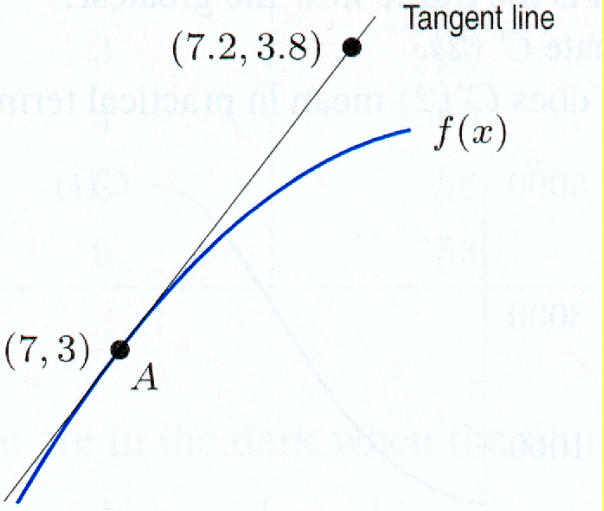

Figure 2.60

Problem 21:

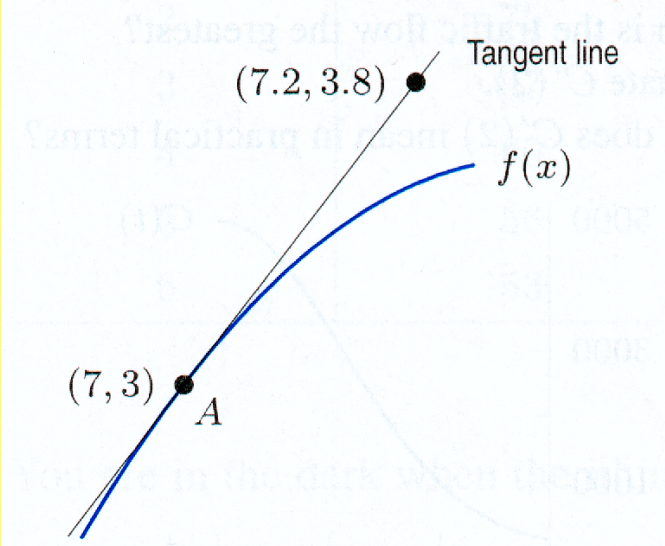

Figure 2.60

$f(\square) = \square$ at the point A

Problem 21:

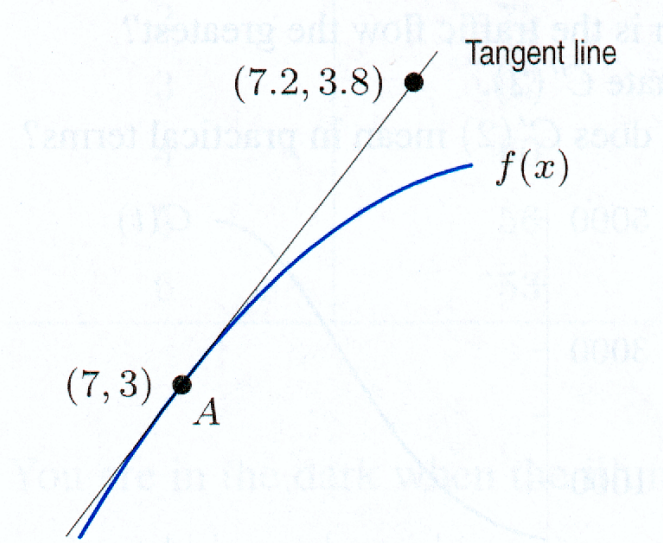

Figure 2.60

$f(\boxed{7}) = \boxed{3}$ at the point A

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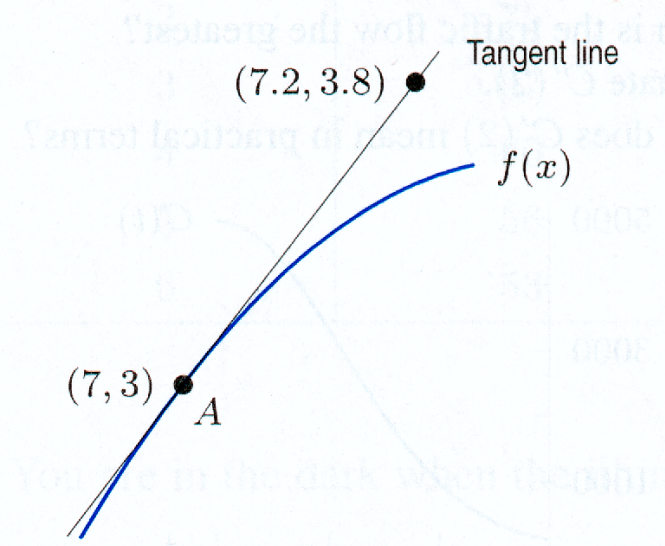

Figure 2.60

$f'(\square) = \square$ at the point A

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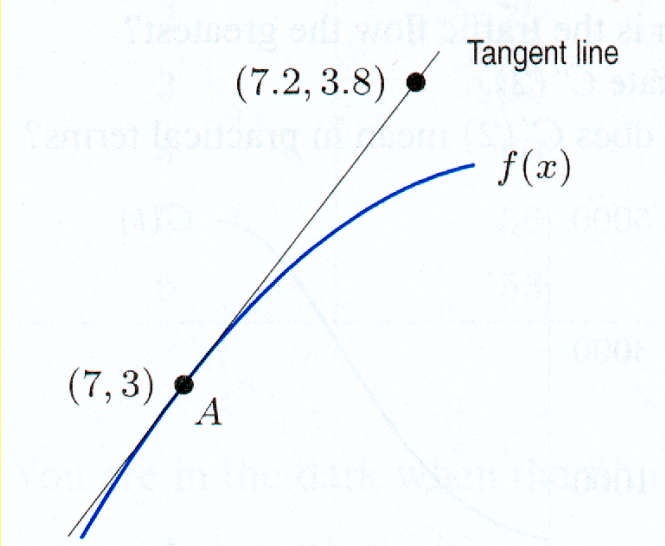

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$f'(\boxed{7}) = \boxed{}$ at the point A

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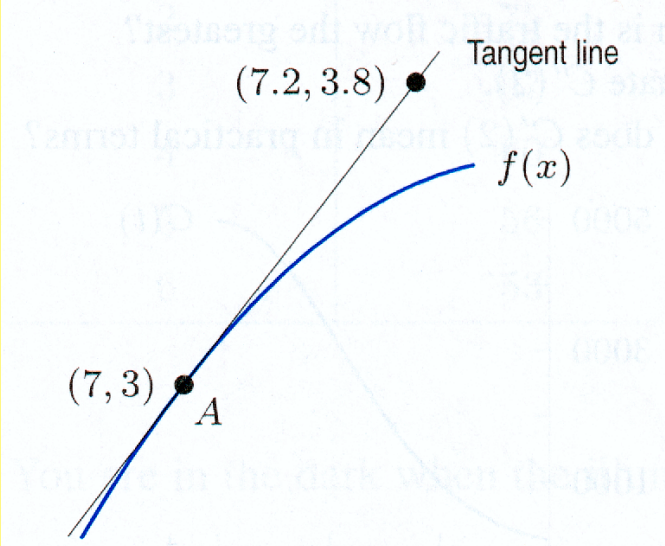

Figure 2.60

$$f'(\boxed{7}) = \boxed{\frac{0.8}{0.2}} \quad \text{at the point } A$$

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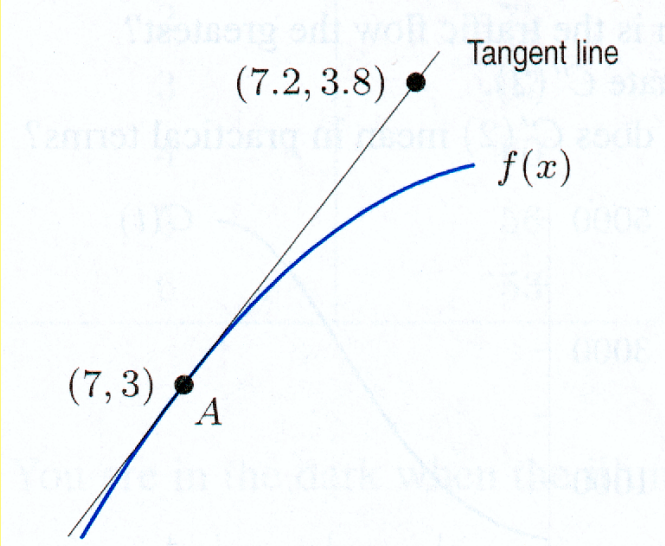
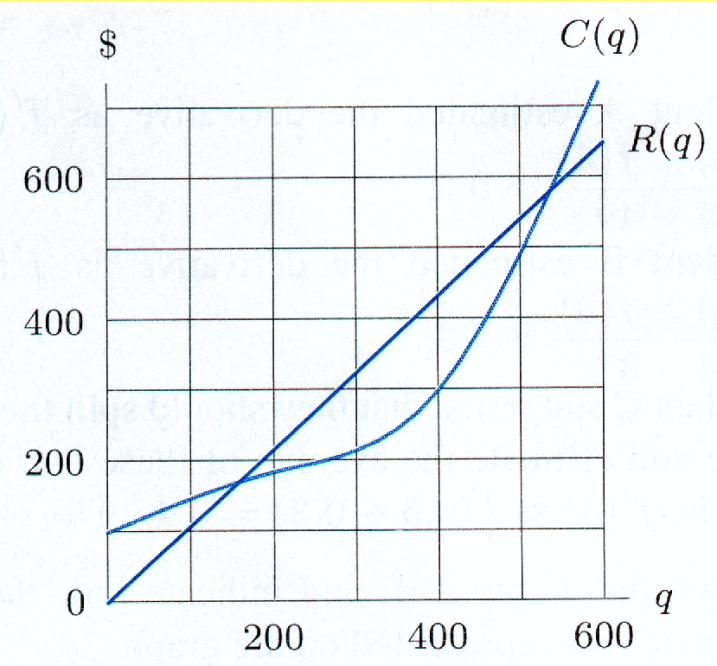


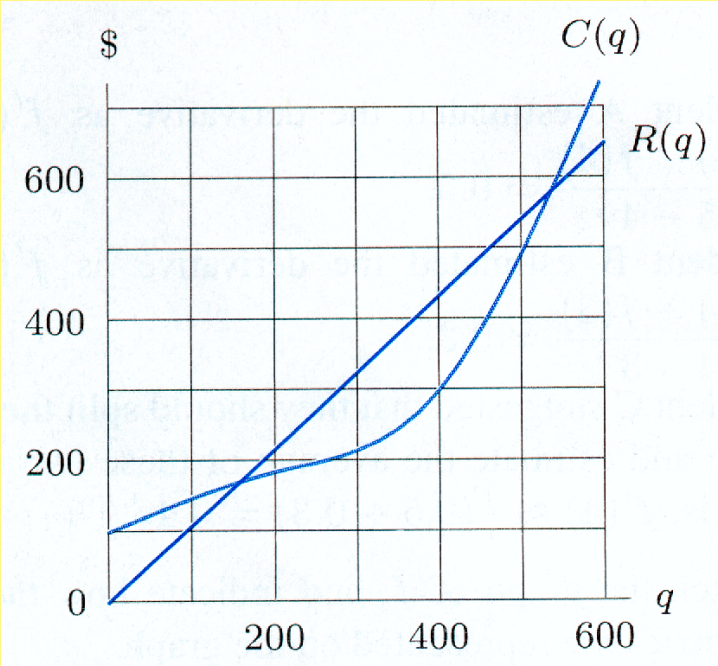
Figure 2.60

$$f'(\boxed{7}) = \boxed{4} \quad \text{at the point } A$$

Problem 24:

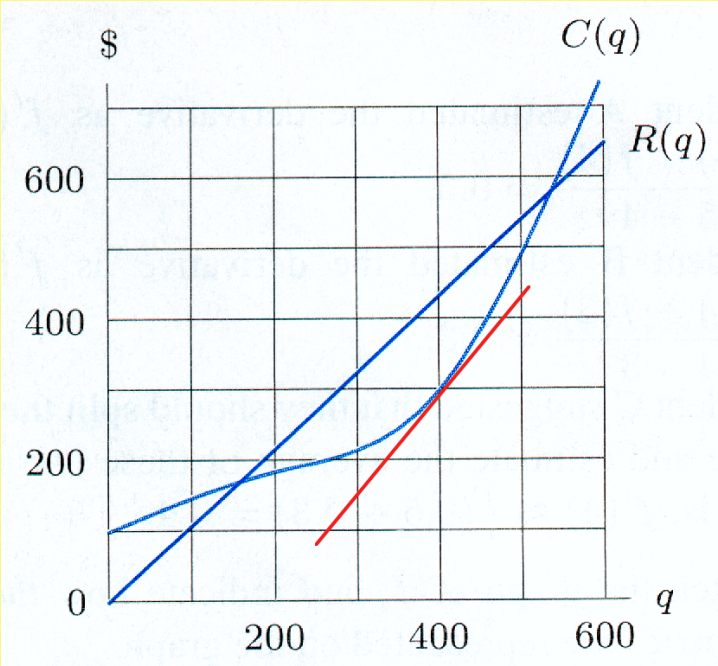


Problem 24:



What's the marginal cost at $q = 400$?

Problem 24:



What's the marginal cost at $q = 400$?

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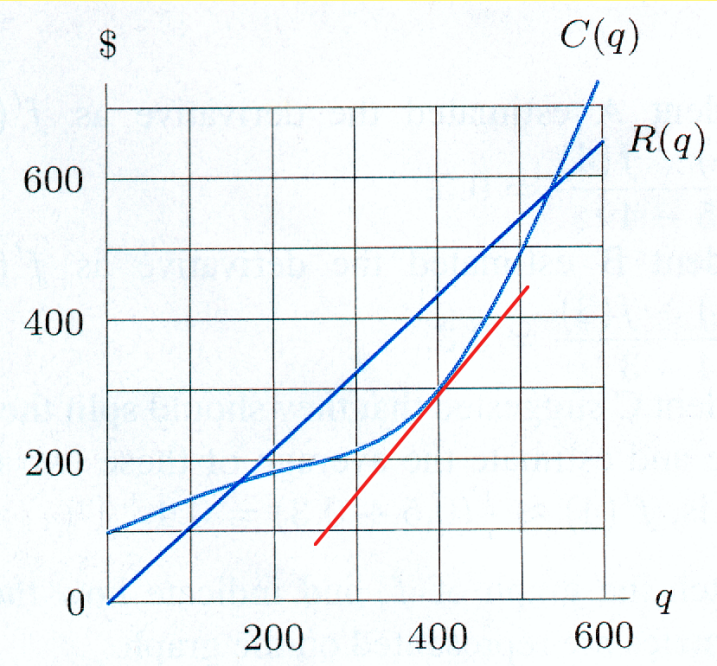
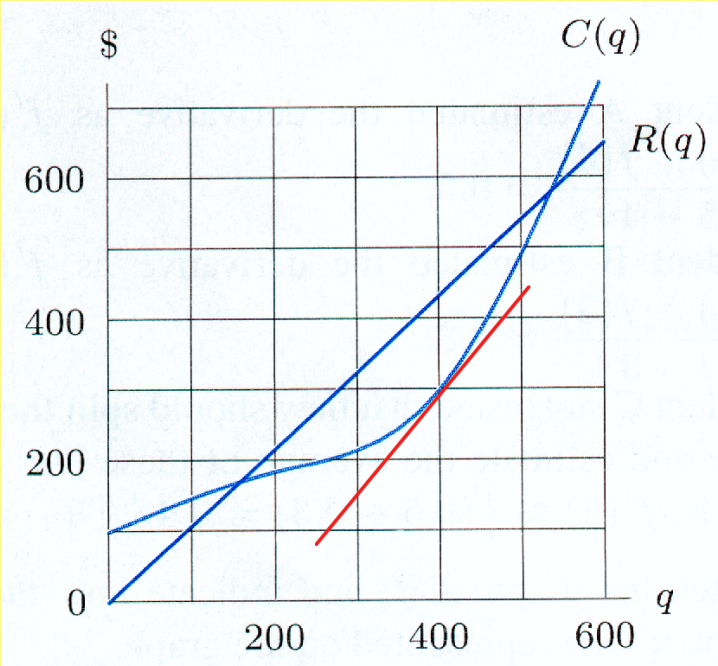


What's the marginal cost at $q = 400$?

$C'(400) \approx$

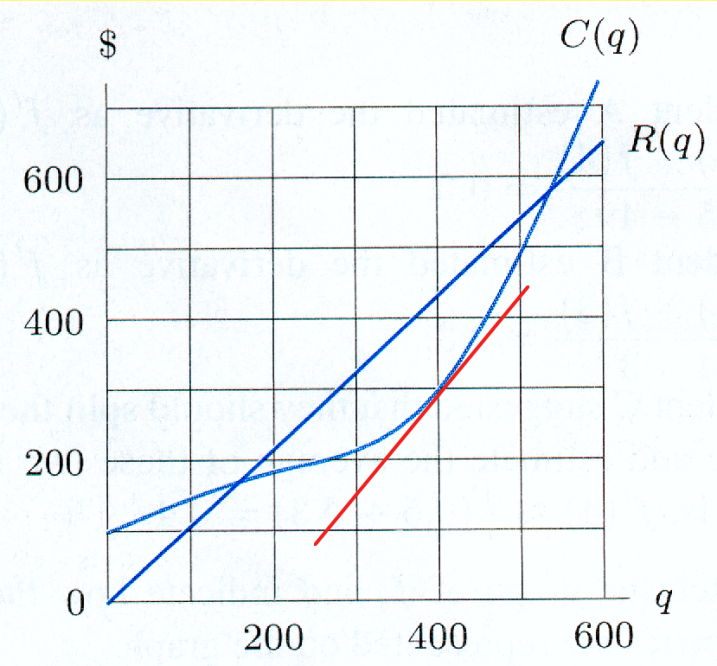
Problem 24:



What's the marginal cost at $q = 400$?

$$C'(400) \approx \frac{320}{240}$$

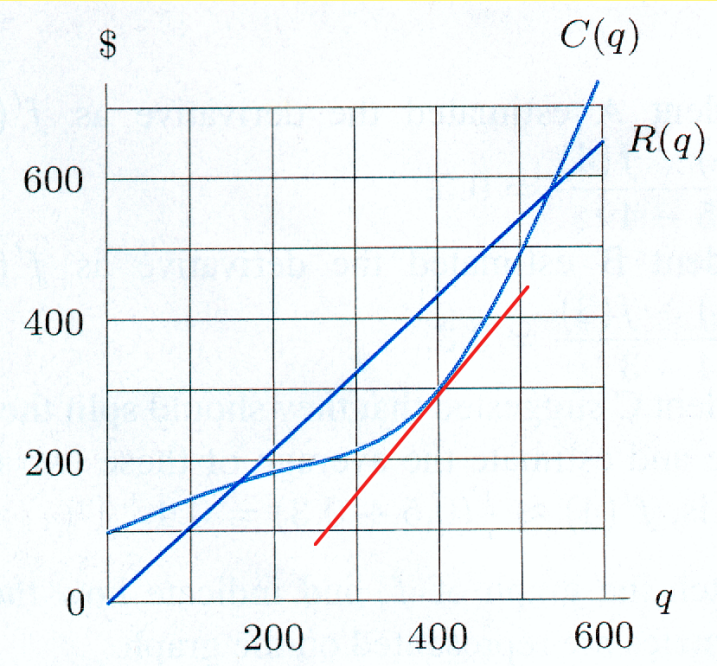
Problem 24:



What's the marginal cost at $q = 400$?

$$C'(400) \approx \frac{320}{240} \approx \frac{4}{3}$$

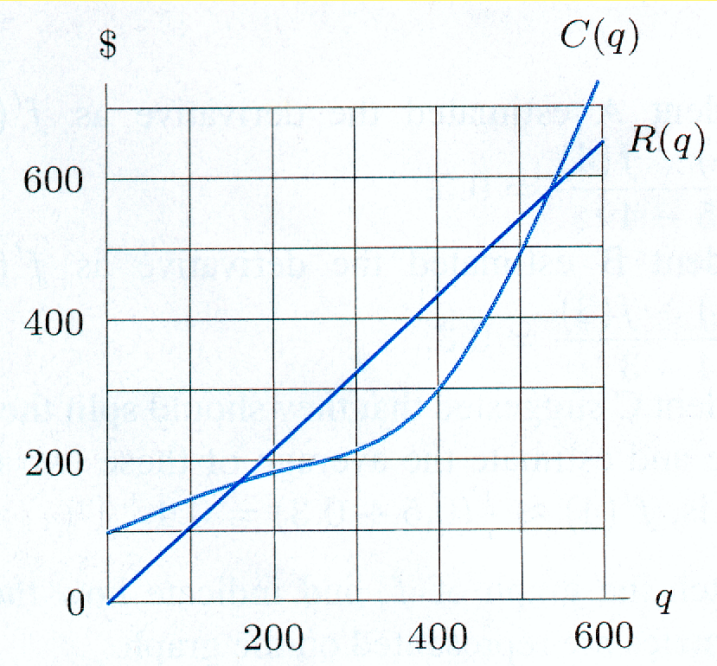
Problem 24:



What's the marginal cost at $q = 400$?

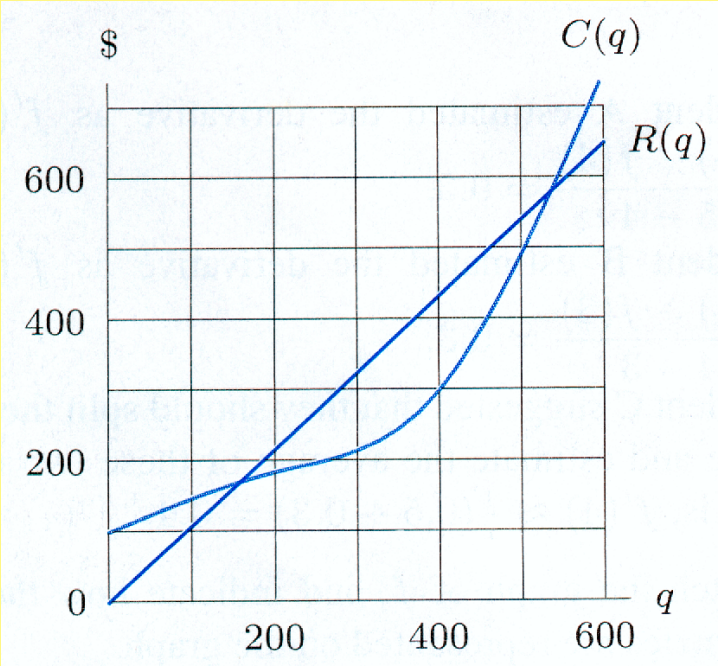
$$C'(400) \approx \frac{320}{240} \approx \frac{4}{3} \quad \text{dollars/item}$$

Problem 24:



Should the $\mathbf{500^{th}}$ item be produced?

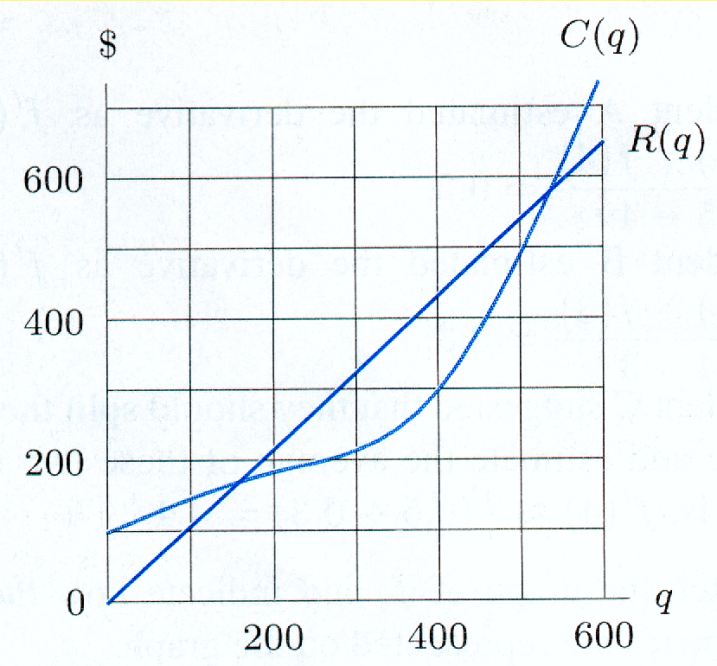
Problem 24:



Should the $\mathbf{500^{th}}$ item be produced?

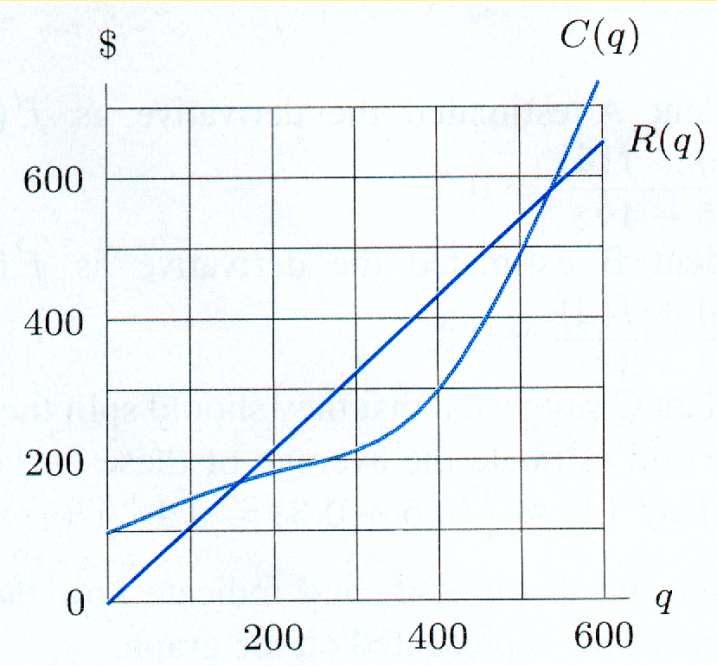
No, the total profit will decrease.

Problem 24:



What quantity maximizes profit?

Problem 24:



What quantity maximizes profit?

$$q = 350$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

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$$C(50) = 4300 \qquad C'(50) = 24$$

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$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C(50) = 4300 \qquad C'(50) = 24$$

$$C(52) = \,?$$

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$C(q)$ cost $\qquad$ $R(q)$ revenue

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$$C(52) = 4300$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C(50) = 4300 \qquad C'(50) = 24$$

$$C(52) = 4300 + 24$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C(50) = 4300 \qquad C'(50) = 24$$

$$C(52) = 4300 + 24 \cdot 2$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C(50) = 4300 \qquad C'(50) = 24$$

$$C(52) = 4300 + 24 \cdot 2 = 4300 + 48$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C(50) = 4300 \qquad C'(50) = 24$$

$$C(52) = 4300 + 24 \cdot 2 = 4300 + 48 = 4348$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C(50) = 4300 \qquad C'(50) = 24$$

$$C(52) = 4300 + 24 \cdot 2 = 4300 + 48 = 4348$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C(50) = 4300 \qquad C'(50) = 24$$

$$C(52) = 4300 + 24 \cdot 2 = 4300 + 48 = 4348$$
$$C(48) = 4300 - 24 \cdot 2 = 4300 - 48 = 4252$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(50) = 24 \qquad R'(50) = 35$$

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

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How much profit is earned selling the 51^{st} item?

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(50) = 24 \qquad R'(50) = 35$$

How much profit is earned selling the 51^{st} item?

Cost will increase by $\square$.

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(50) = 24 \qquad R'(50) = 35$$

How much profit is earned selling the 51^{st} item?

Cost will increase by $\boxed{\$24}$.

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(50) = 24 \qquad R'(50) = 35$$

How much profit is earned selling the 51^{st} item?

Cost will increase by $\boxed{\$24}$. Revenue will increase by $\boxed{}$.

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(50) = 24 \qquad R'(50) = 35$$

How much profit is earned selling the 51^{st} item?

Cost will increase by $\boxed{\$24}$. Revenue will increase by $\boxed{\$35}$.

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(50) = 24 \qquad R'(50) = 35$$

How much profit is earned selling the 51^{st} item?

Cost will increase by $\boxed{\$24}$. Revenue will increase by $\boxed{\$35}$.

The profit earned will be $35 - 24 = \$11$.

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(50) = 24 \qquad R'(50) = 35$$

How much profit is earned selling the 51^{st} item?

Cost will increase by $\boxed{\$24}$. Revenue will increase by $\boxed{\$35}$.

The profit earned will be $35 - 24 = \$11$.

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(100) = 38 \qquad R'(100) = 35$$

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Should the company produce the 101^{st} item?

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$C'(100) = 38 \qquad R'(100) = 35$

Should the company produce the 101^{st} item?

Cost will increase by $\square$. Revenue will increase by $\square$.

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(100) = 38 \qquad R'(100) = 35$$

Should the company produce the 101^{st} item?

Cost will increase by $\boxed{\$38}$. Revenue will increase by $\boxed{\$35}$.

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

$$C'(100) = 38 \qquad R'(100) = 35$$

Should the company produce the 101^{st} item?

Cost will increase by $\boxed{\$38}$. Revenue will increase by $\boxed{\$35}$.

No, the company will lose money

Problem 26:

$C(q)$ cost $\qquad$ $R(q)$ revenue

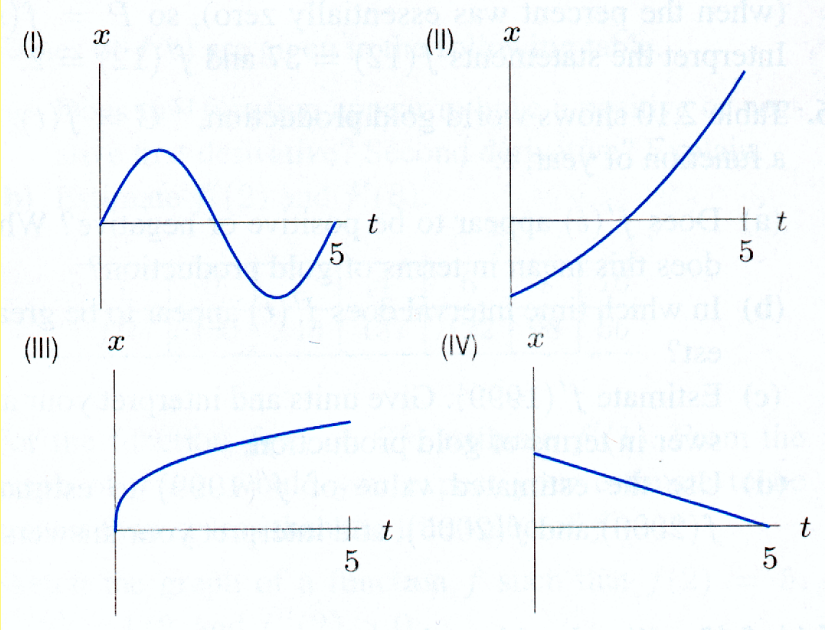
$$C'(100) = 38 \qquad R'(100) = 35$$

Should the company produce the 101^{st} item?

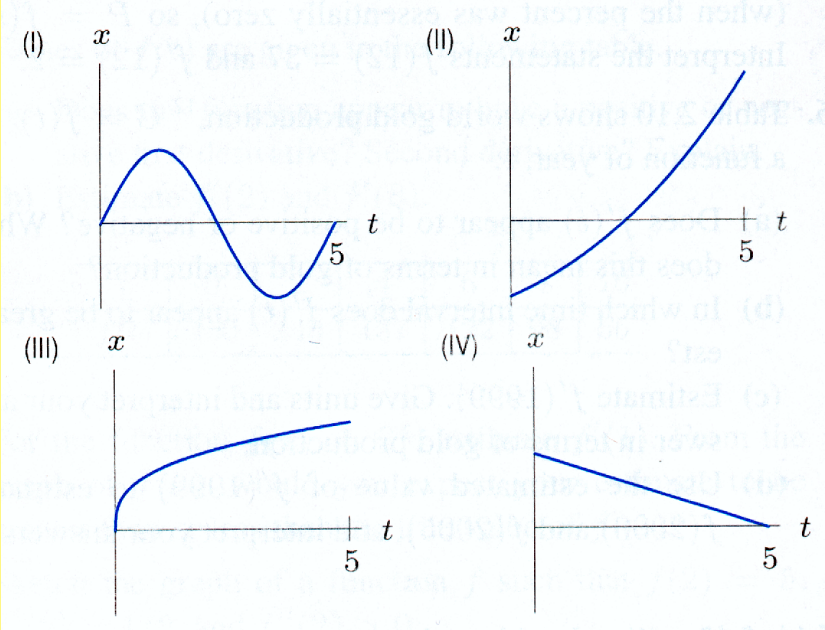
Cost will increase by $\boxed{\$38}$. Revenue will increase by $\boxed{\$35}$.

No, the company will lose money
even if it sells the 101^{st} item.

Problem 28:

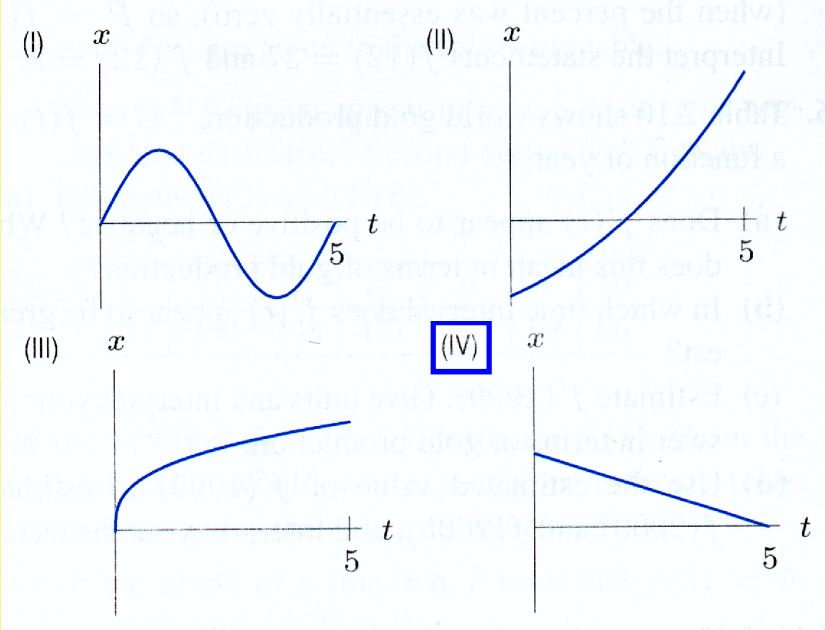


Problem 28:



Which particle has constant velocity?

Problem 28:



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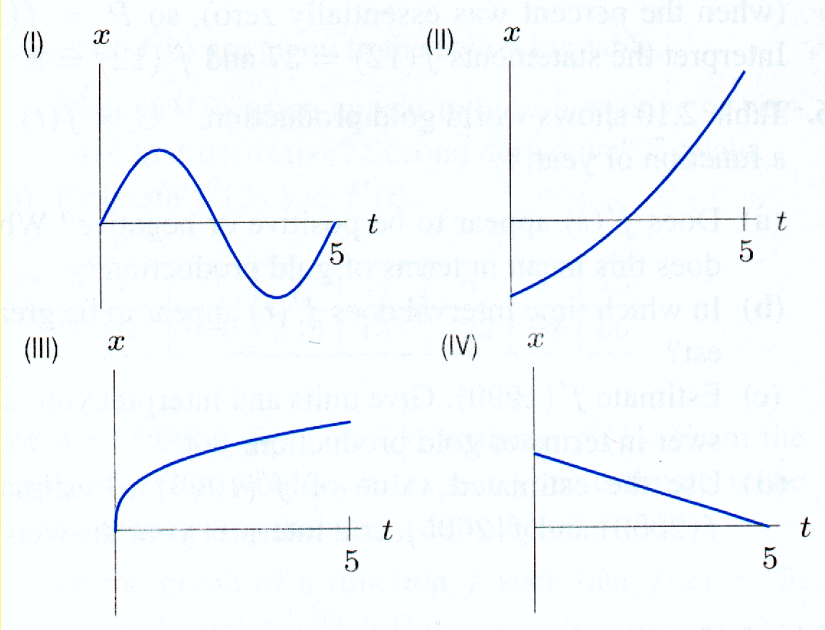
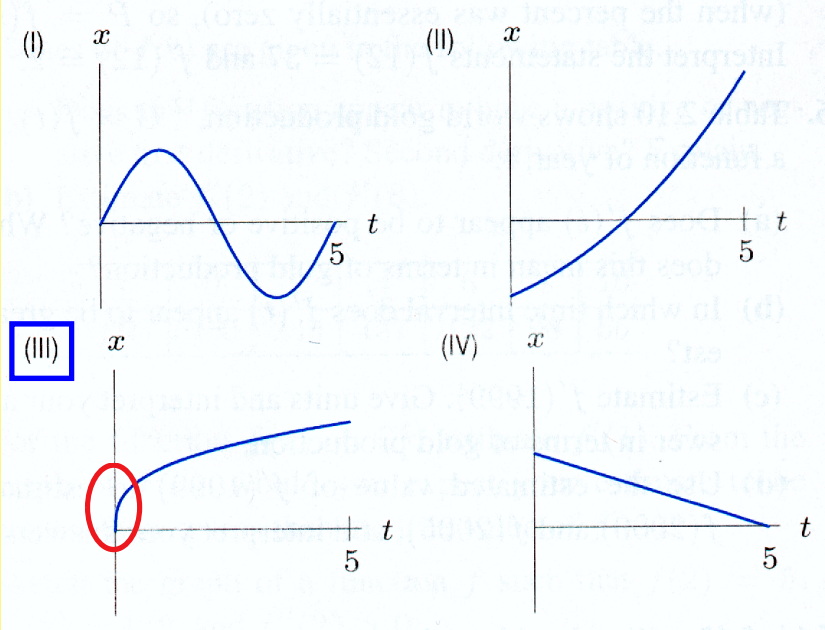


Which particle has the greatest initial velocity?

Problem 28:



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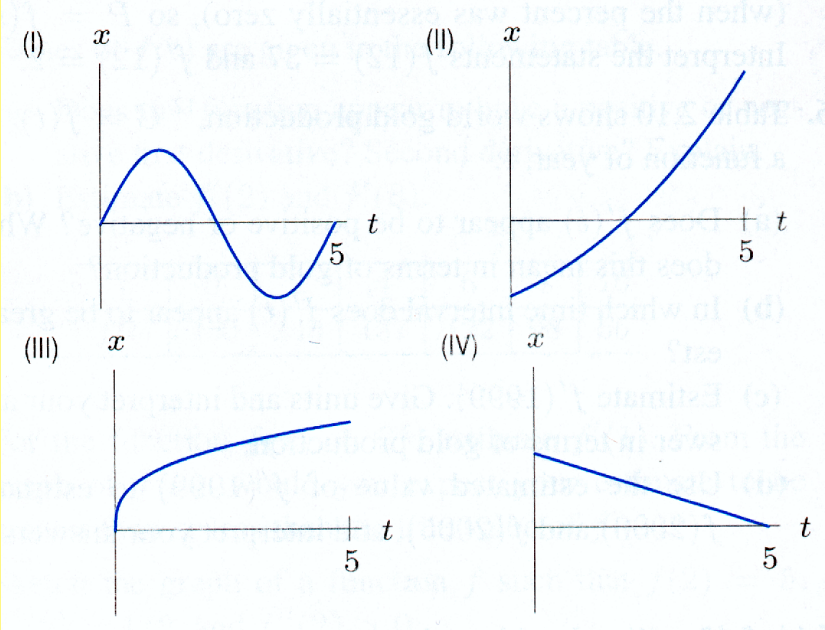
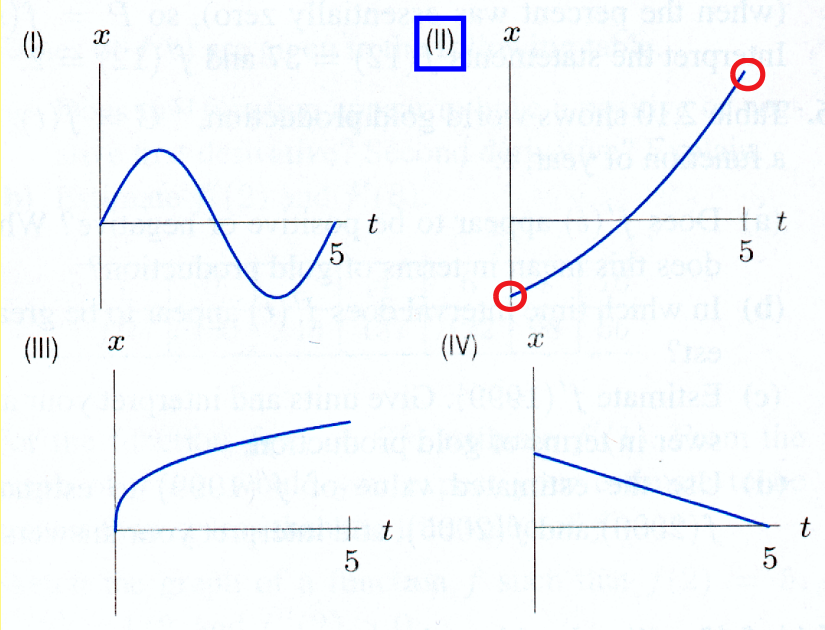


Which particle has the greatest average velocity?

Problem 28:



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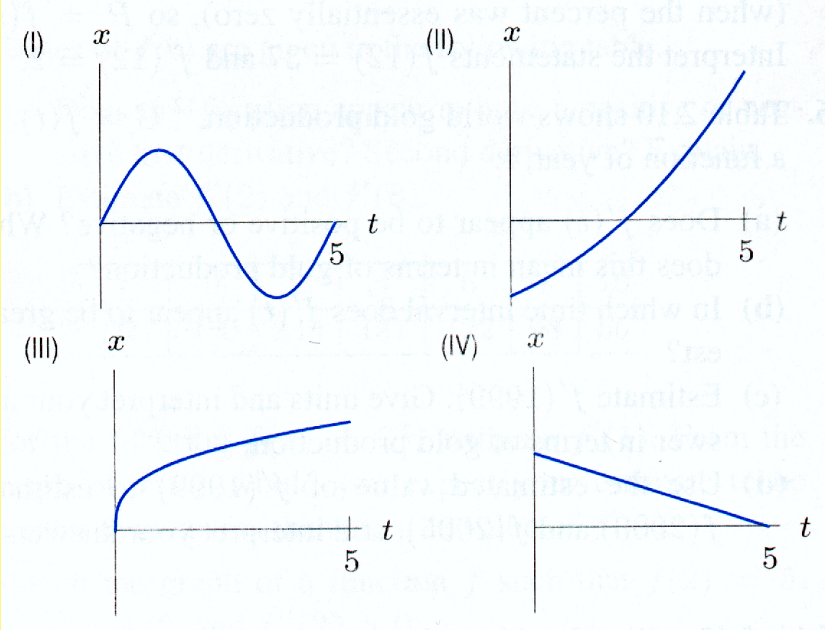
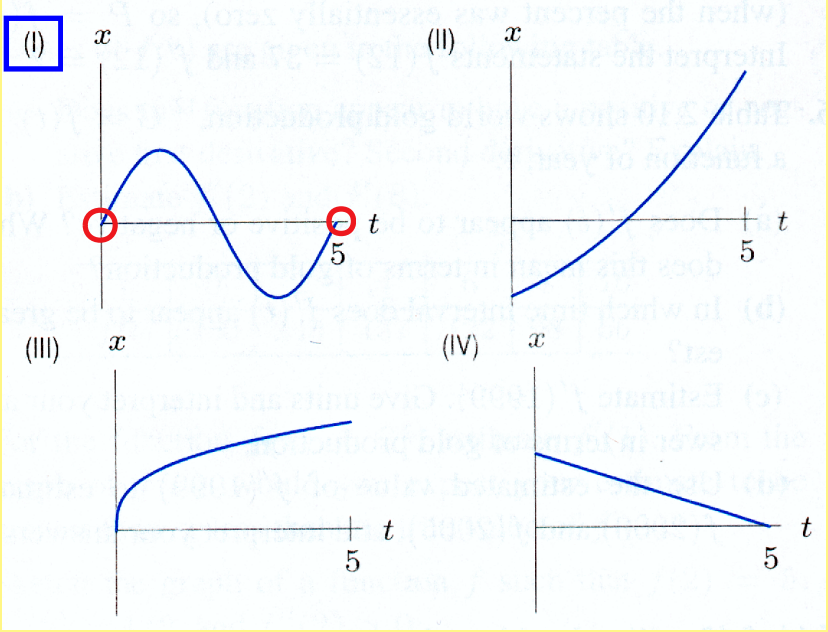


Which particle has zero average velocity?

Problem 28:



Which particle has zero average velocity?