This print-out should have 39 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Determine

$$\lim_{x \to 0} \left(\frac{2}{x^2 + 2x} - \frac{1}{x} \right) .$$

1. limit $= -\frac{1}{3}$

2. limit $= -2$

3. limit $= \frac{1}{3}$

4. limit $= \frac{1}{2}$

5. limit $= -\frac{1}{2}$

6. limit $= 2$

002 10.0 points

Determine if the limit

$$\lim_{x \to 0} \frac{\dfrac{6}{x+1} - 6}{x}$$

exists, and if it does, find its value.

1. limit $= -6$

2. limit does not exist

3. limit $= 6$

4. limit $= 7$

5. limit $= -7$

003 10.0 points

Determine which, if any, of

$$f(x) = 6^{-x} + 3 ,$$
$$g(x) = 6^{3-x} ,$$
$$h(x) = -6^{x-3} ,$$

define the same function.

1. only $f,\ h$

2. only $g,\ h$

3. $f,\ g,$ and h

4. only $g,\ f$

5. no two of $f,\ g,$ or h

004 10.0 points

Determine which, if any, of the following

$$f(x) = 9^x + 9 ,$$
$$g(x) = 3^{2x+3} ,$$
$$h(x) = 27\,(9^x) ,$$

define the same function.

1. $f,\ g,$ and h

2. only $f,\ h$

3. only $g,\ h$

4. only $g,\ f$

5. none of $f,\ g,$ or h

005 (part 1 of 2) 10.0 points

Write the polynomial

$$6 - 5x + 5x^4 - 7x^9$$

in standard form.

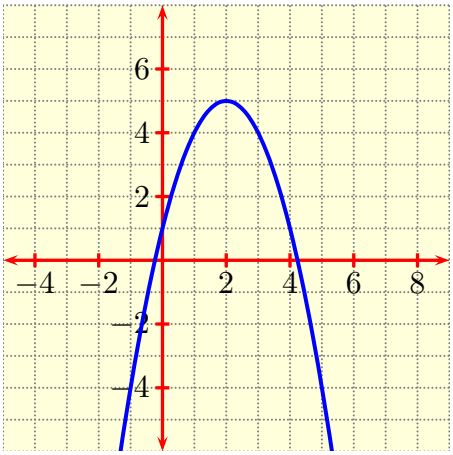
a) What is its degree?

006 (part 2 of 2) 10.0 points

b) What is the leading coefficient?

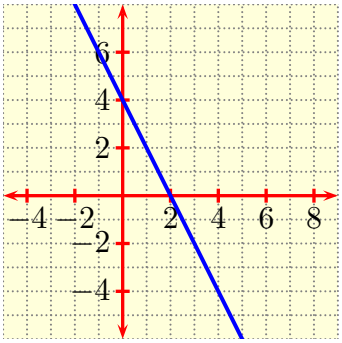
007 10.0 points

If f is a function having

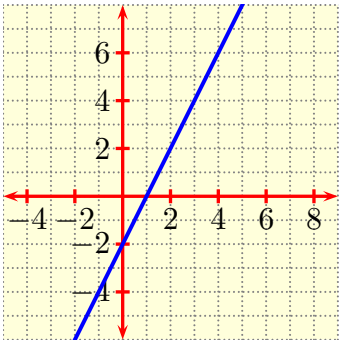


as its graph, which of the following could be the graph of f'?

1.



2.



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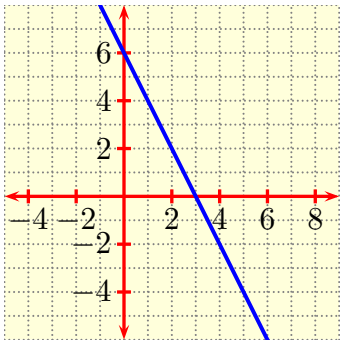

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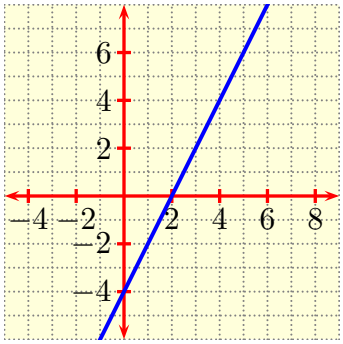
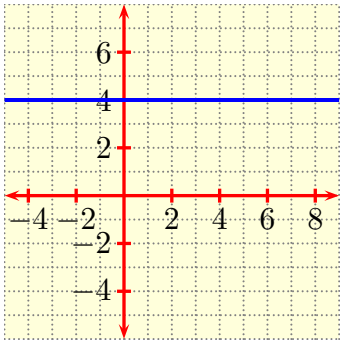


5.



008 10.0 points

Determine

$$\lim_{x \to 0} \frac{x-1}{x^2(x+8)}\,.$$

1. limit $= 1$

2. limit $= -\dfrac{1}{8}$

3. limit $= -\infty$

4. limit $= \infty$

5. limit $= 0$

6. none of the other answers

009 10.0 points

If a, b are the solutions of the exponential equation

$$3^{x^2} = 9^{-\frac{3}{2}x+9}$$

calculate the value of $|a+b|$.

1. $|a+b| = -3$

2. $|a+b| = 3$

3. $|a+b| = 5$

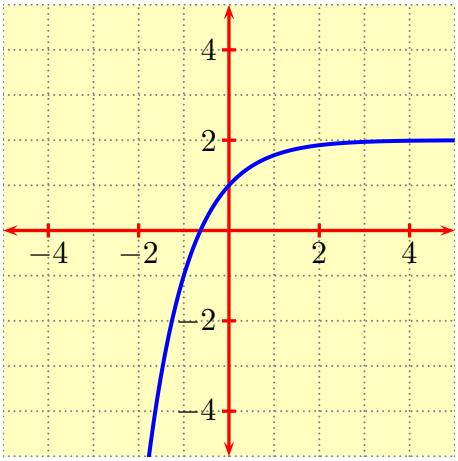
4. $|a+b| = 11$

5. $|a+b| = 4$

---

010 10.0 points

Which function has



as its graph?

1. $f(x) = 3^x - 3$

2. $f(x) = 3^{-x} - 2$

3. $f(x) = 2 - 3^{-x}$

4. $f(x) = 2^{-x-1} - 2$

5. $f(x) = 2^{x-1} - 3$

6. $f(x) = 2 - 2^{-x-1}$

---

011 10.0 points

The straight line ℓ is parallel to $y + 4x = 5$ and passes through the point $P(4, 3)$. Find its y-intercept.

1. y-intercept $= 20$

2. y-intercept $= 21$

3. y-intercept $= 19$

4. y-intercept $= -13$

5. y-intercept $= -12$

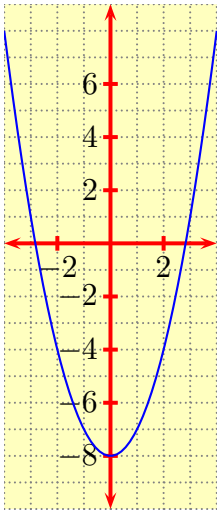
---

012 10.0 points

Sketch the graph of the function

$$f(x) = (x+8)^2 .$$

1.



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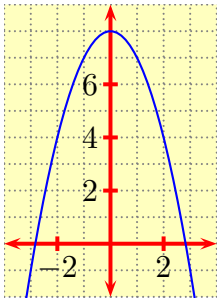

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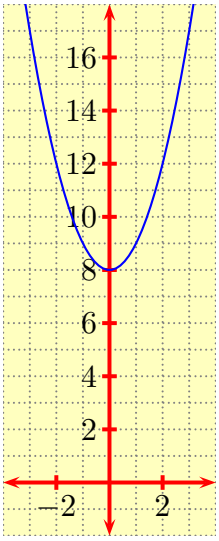

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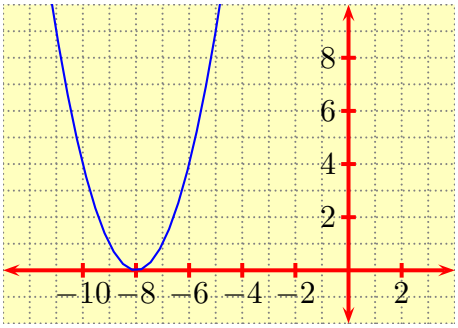

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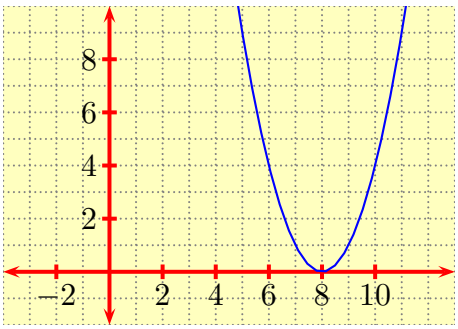


6. None of these

---

013 10.0 points

Find all values of x at which the function f defined by

$$f(x) = \frac{x-8}{x^2+9}$$

is not continuous?

1. $x = 3$

2. $x = -3,\ 8$

3. $x = -3,\ 3$

4. $x = 8$

5. $x = -3$

6. no values of x

---

014 10.0 points

Determine which of the following functions (if any) are the same.

$$f(x) = 9^{-x} + 7$$

$$g(x) = 9^{7-x}$$

$$h(x) = -9^{x-7}$$

1. $f(x) = g(x) = h(x)$

2. None of these

3. $g(x) = f(x)$ only

4. $g(x) = h(x)$ only

5. $f(x) = h(x)$ only

---

015 10.0 points

Find all values of x at which the function f defined by

$$f(x) = \frac{x-7}{x^2-x-42}$$

is continuous, expressing your answer in interval notation.

1. $(-\infty, -6) \cup (-6, \infty)$

2. $(-\infty, -7) \cup (-7, 6) \cup (6, \infty)$

3. $(-\infty, 7) \cup (7, \infty)$

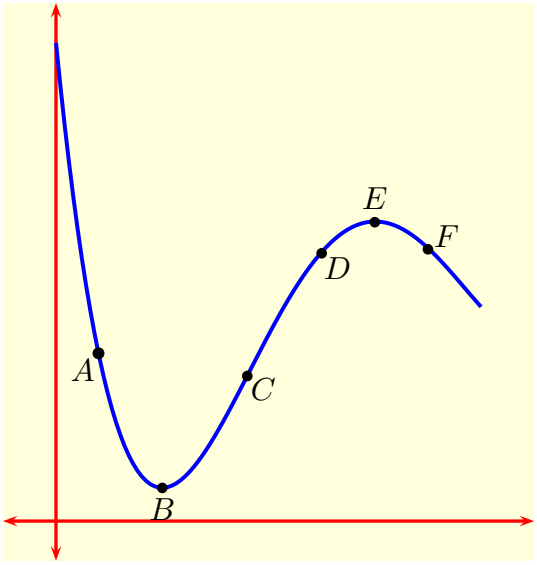
4. $(-\infty, -6) \cup (-6, 7) \cup (7, \infty)$

5. $(-\infty, -6) \cup (-6, -7) \cup (-7, \infty)$

---

016 (part 1 of 5) 10.0 points

At which point on the graph



is the slope greatest (*i.e.*, most positive)?

1. B

2. A

3. C

4. E

5. F

6. D

---

017 (part 2 of 5) 10.0 points

At which point is the slope smallest (*i.e.*, most negative)?

1. D

2. E

3. C

4. F

5. B

6. A

---

018 (part 3 of 5) 10.0 points

At which point does the slope change from positive to negative?

1. E

2. C

3. F

4. A

5. D

6. B

---

019 (part 4 of 5) 10.0 points

At which point does the slope change from negative to positive?

1. E

2. B

3. D

4. F

5. A

6. C

---

020 (part 5 of 5) 10.0 points

At which point is the tangent line parallel to the secant line $\overline{BF}$?

1. E

2. C

3. B

4. F

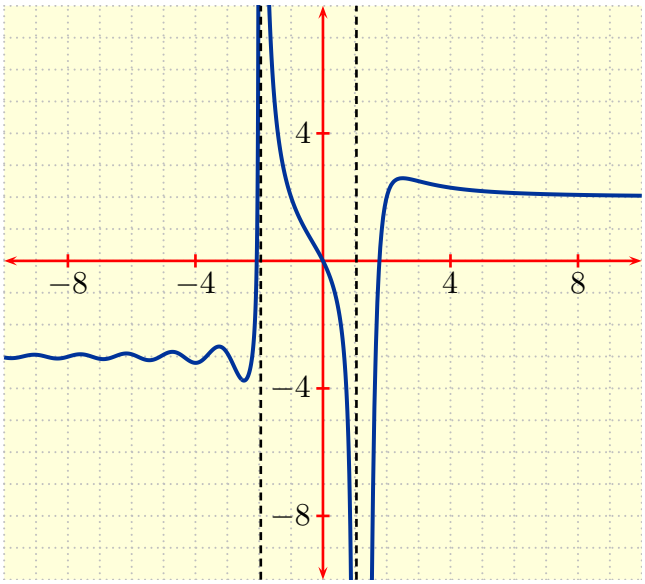
5. A

6. D

---

021 (part 1 of 3) 10.0 points

A certain function f is given by the graph



(i) What is the value of

$$\lim_{x \to -\infty} f(x)$$

1. limit does not exist

2. limit $= 2$

3. limit $= -2$

4. limit $= 3$

5. limit $= -3$

022 (part 2 of 3) 10.0 points

(ii) What is the value of

$$\lim_{x \to \infty} f(x)?$$

1. limit $= 2$

2. limit does not exist

3. limit $= -3$

4. limit $= 3$

5. limit $= -2$

023 (part 3 of 3) 10.0 points

(iii) What is the value of

$$\lim_{x \to -2} f(x)?$$

1. limit $= -2$

2. limit $= \infty$

3. limit $= 2$

4. limit $= 3$

5. limit $= -3$

024 10.0 points

Find the largest value of c so that the function g defined by

$$g(x) = \begin{cases} x^2 - 3x - c^2, & x > 3, \\ cx - 4, & x \le 3, \end{cases}$$

is continuous for all x.

1. $c = 4$

2. $c = 5$

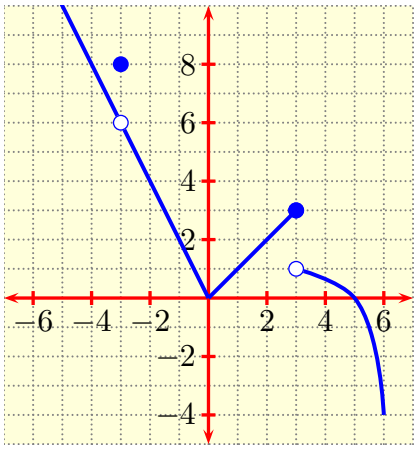
3. $c = -5$

4. none of these

5. $c = -4$

025 10.0 points

Below is the graph of a function f.



Use the graph to determine

$$\lim_{x \to 3} f(x) .$$

1. limit = 8

2. limit = 12

3. limit = 6

4. limit does not exist

5. limit = 3

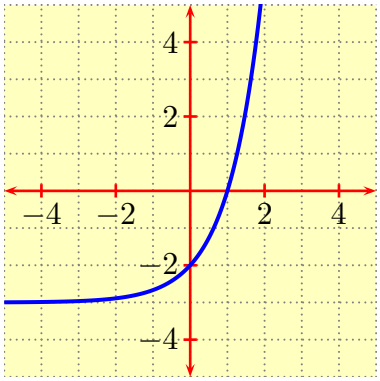
---

026 10.0 points

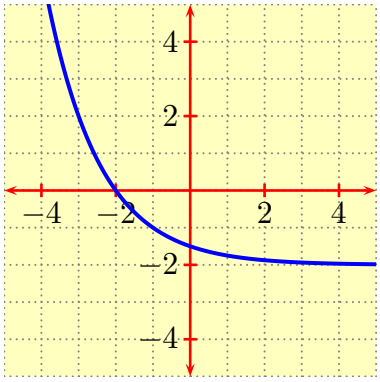
Which of the following is the graph of

$$f(x) = 2^{x-1} - 3 ?$$

1.



2.



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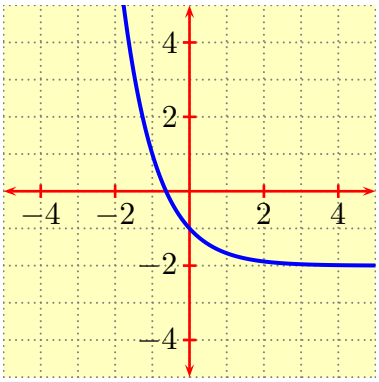

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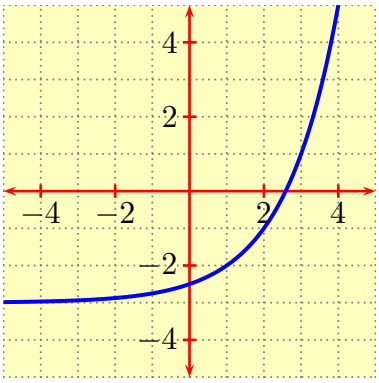

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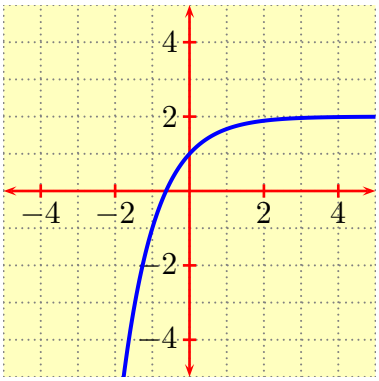
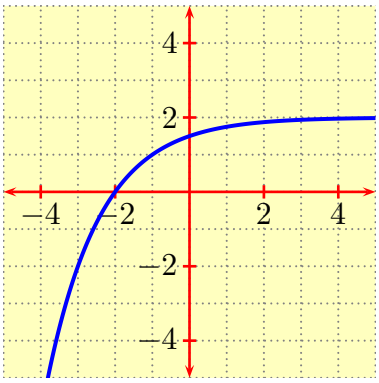


6.



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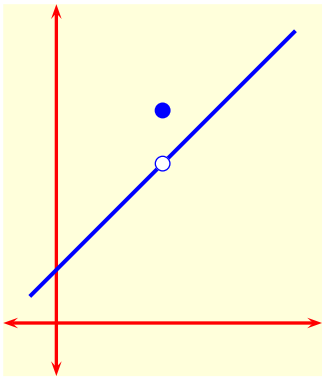
027 10.0 points

Determine which of the following could be

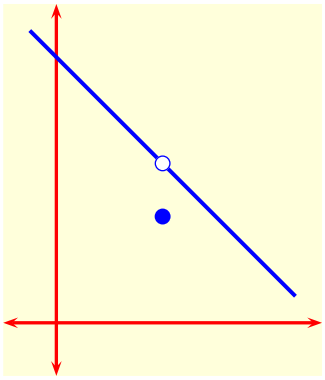
the graph of f near the origin when

$$f(x) = \begin{cases} \dfrac{x^2 - 7x + 10}{2 - x}, & x \neq 2, \\ 2, & x = 2. \end{cases}$$

1.



2.



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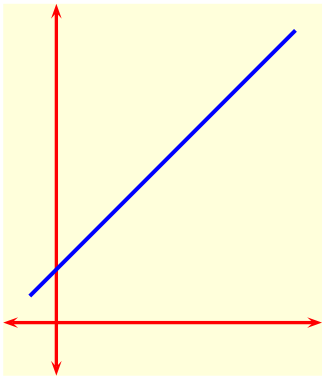

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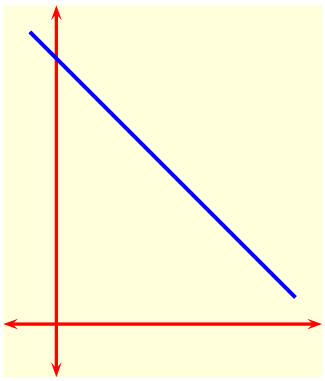

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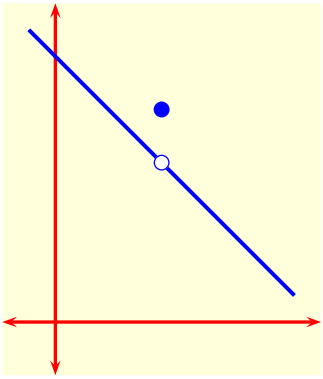

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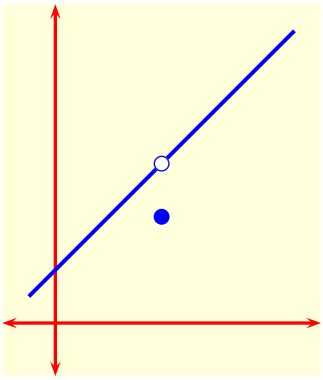

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028 10.0 points

Evaluate

$$\lim_{x \to -2} \frac{x + 2}{x^2 - 4x - 12}.$$

1. limit $= \dfrac{1}{4}$

2. limit $= -\dfrac{1}{8}$

3. limit does not exist

4. limit $= -\dfrac{1}{4}$

5. limit $= \dfrac{1}{8}$

6. limit $= -4$

---

029 10.0 points

Find the value of

$$\lim_{x \to 0} \frac{(3x - 2)^2 - 4}{5x}$$

if the limit exists.

1. limit $= -\dfrac{12}{5}$

2. limit $= \dfrac{12}{5}$

3. limit $= \dfrac{6}{5}$

4. limit does not exist

5. limit $= -\dfrac{6}{5}$

---

030 10.0 points

Let F be the function defined by

$$F(x) = \frac{x^2 - 9}{|x - 3|}.$$

Determine if

$$\lim_{x \to 3^-} F(x)$$

exists, and if it does, find its value.

1. limit does not exist

2. limit $= -3$

3. limit $= 3$

4. limit $= -6$

5. limit $= 6$

---

031 10.0 points

If the function f defined by

$$f(x) = \begin{cases} cx + 4\,, & x < 2\,, \\ 4x^2 - 4\,, & x \geq 2\,, \end{cases}$$

is continuous everywhere on $(-\infty, \infty)$, what is the value of $f(1)$?

1. $f(1) = 9$

2. $f(1) = 12$

3. $f(1) = 10$

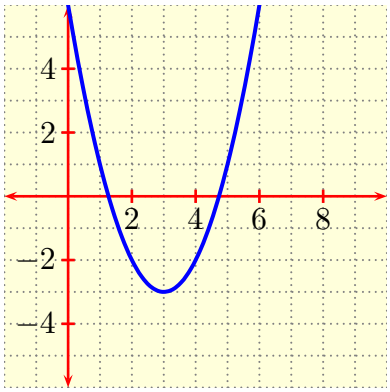
4. $f(1) = 8$

5. $f(1) = 11$

---

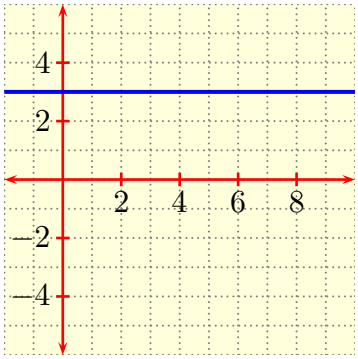
032 10.0 points

If f is a function having

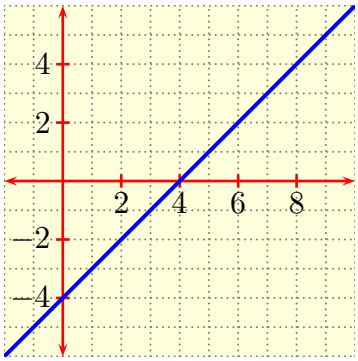


as its graph, which of the following is the graph of the derivative f' of f?

1.



2.



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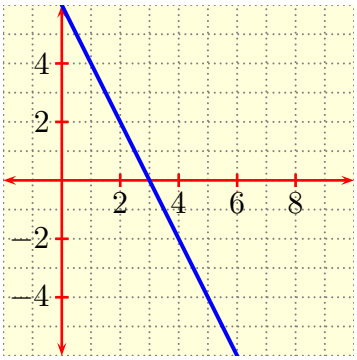

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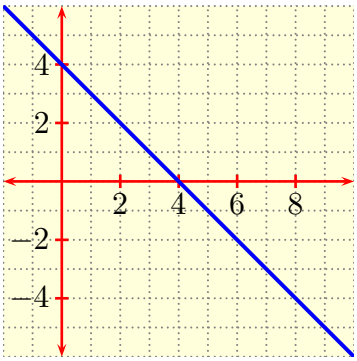
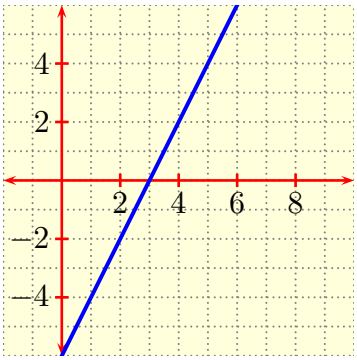


5.



033 10.0 points

If the function f is continuous everywhere and

$$f(x) = \frac{x^2 - 9}{x - 3}$$

when $x \neq 3$, find the value of $f(3)$.

1. $f(3) = 3$

2. $f(3) = 6$

3. $f(3) = -3$

4. $f(3) = -9$

5. $f(3) = 9$

6. $f(3) = -6$

034 (part 1 of 3) 10.0 points

Determine the value of

$$\lim_{x \to 2+} \frac{x - 8}{x - 2}\,.$$

1. none of the other answers

2. limit $= 4$

3. limit $= \infty$

4. limit $= -4$

5. limit $= -\infty$

035 (part 2 of 3) 10.0 points

Determine the value of

$$\lim_{x \to 2-} \frac{x - 8}{x - 2}\,.$$

1. limit $= -\infty$

2. limit $= 4$

3. limit $= \infty$

4. none of the other answers

5. limit $= -4$

036 (part 3 of 3) 10.0 points

Determine the value of

$$\lim_{x \to 2} \frac{x - 8}{x - 2}\,.$$

1. limit $= \infty$

2. limit $= 4$

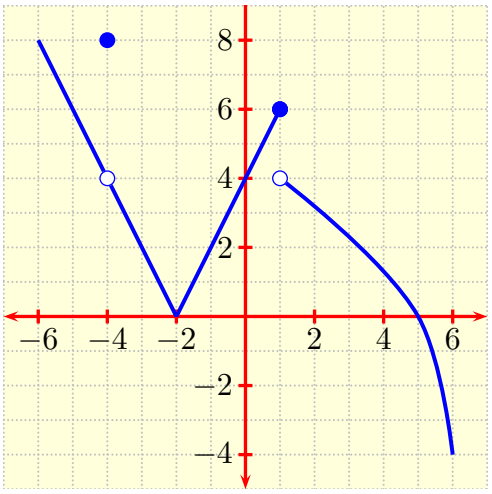
3. limit $= -\infty$

4. limit $= -4$

5. none of the other answers

037 10.0 points

Below is the graph of a function f.



Use the graph to determine all the values of x on $(-6,\ 6)$ at which f fails to be continuous.

1. $x = -4\,, 1$

2. none of the other answers

3. $x = 1$

4. $x = -4$

5. no values of x

038 10.0 points

Find the solution of the exponential equation

$$4^{15x} = 16^{\frac{9}{2}x-4}.$$

039 10.0 points

A tank holds 1000 gallons of water, which drains from the bottom of the tank in half an hour. The values in the table

t (min)	5	10	15	20	25	30
V (gal)	644	466	212	116	19	0

show the volume, $V(t)$, of water remaining in the tank (in gallons) after t minutes.

If P is the point $(15,\ V(15))$ on the graph of V as a function of time t, find the slope of the secant line PQ when $Q = (25,\ V(25))$.

1. slope $= -38.6$

2. slope $= -19.3$

3. slope $= -43.2$

4. slope $= -9.6$

5. slope $= -25.4$