This print-out should have 20 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

When f, g, F and G are functions such that

$$\lim_{x\to 1} f(x) = 0, \qquad \lim_{x\to 1} g(x) = 0,$$

$$\lim_{x\to 1} F(x) = 2, \qquad \lim_{x\to 1} G(x) = \infty,$$

which, if any, of

A. $\lim_{x\to 1} \dfrac{f(x)}{g(x)}$,

B. $\lim_{x\to 1} \dfrac{g(x)}{G(x)}$,

C. $\lim_{x\to 1} f(x)^{g(x)}$,

are indeterminate forms?

1. A and B only

2. A and C only

3. B and C only

4. none of them

5. C only

6. all of them

7. B only

8. A only

002 10.0 points

Determine if

$$\lim_{x\to -1} \left(\frac{4x^2+5}{x^2+1}\right)$$

exists, and if it does, find its value.

1. limit does not exist

2. limit $= \dfrac{9}{2}$

3. limit $= 9$

4. limit $= 4$

5. limit $= 5$

003 10.0 points

Determine if

$$\lim_{x\to 0} \frac{e^{3x}-1}{\sin(2x)}$$

exists, and if it does, find its value.

1. none of the other answers

2. limit $= \dfrac{2}{3}$

3. limit $= -\infty$

4. limit $= \infty$

5. limit $= \dfrac{3}{2}$

6. limit $= 0$

004 10.0 points

Find the value of

$$\lim_{x\to 1} \frac{\ln(3x^2+6x-8)}{x^2-1}.$$

1. limit $= 14$

2. limit $= 6$

3. limit $= 12$

4. limit $= \dfrac{13}{2}$

5. limit $= 0$

6. limit does not exist

---

005 10.0 points

Find the value of

$$\lim_{x \to 3} \frac{\ln(x^2 - 8)}{7x - 21}\,.$$

1. limit $= \dfrac{3}{14}$

2. limit $= 1$

3. limit $= \dfrac{3}{7}$

4. limit $= \dfrac{6}{7}$

5. limit $= \dfrac{8}{7}$

6. limit does not exist

---

006 10.0 points

Find the value of

$$\lim_{x \to 0} \frac{1 - \cos(3x)}{5 \sin^2(x)}\,.$$

1. limit $= \dfrac{11}{10}$

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

3. limit $= 1$

4. limit does not exist

5. limit $= \dfrac{9}{10}$

---

007 10.0 points

Determine

$$\lim_{x \to 0} \Big(\frac{e^{7x} - 7x - 1}{3x^2} \Big)\,.$$

1. limit doesn't exist

2. limit $= \dfrac{55}{6}$

3. limit $= \dfrac{23}{3}$

4. limit $= \dfrac{49}{6}$

5. limit $= \dfrac{26}{3}$

---

008 10.0 points

Find the value of

$$\lim_{x \to \infty} \frac{x^7}{7^x}\,.$$

1. none of the other answers

2. limit $= -\infty$

3. limit $= \infty$

4. limit $= 7$

5. limit $= 0$

6. limit $= \dfrac{1}{7}$

---

009 10.0 points

Determine if

$$\lim_{x \to 4} \Big(\frac{1}{\ln(x - 3)} - \frac{1}{x - 4} \Big)$$

exists, and if it does, find its value.

1. limit $= 1$

2. limit $= -\infty$

3. limit $= +\infty$

4. none of the other answers

5. limit $= 0$

6. limit $= \dfrac{1}{2}$

---

010 10.0 points

Determine if

$$\lim_{x \to 0} \left(\frac{4}{x} - \frac{8}{e^{2x} - 1} \right)$$

exists, and if it does, find its value.

1. limit $= 8$

2. limit $= \dfrac{8}{3}$

3. limit $= 2$

4. limit $= 4$

5. limit $= 0$

6. limit does not exist

---

011 10.0 points

Determine if

$$\lim_{x \to \infty} \frac{x}{5} \ln\left(\frac{x+2}{x} \right)$$

exists, and if it does, find its value.

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

2. limit does not exist

3. limit $= 0$

4. limit $= -\dfrac{5}{2}$

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

6. limit $= -\dfrac{2}{5}$

---

012 10.0 points

Determine if

$$\lim_{x \to \infty} \frac{x}{8} \sin\left(\frac{3}{x} \right)$$

exists, and if it does, find its value.

1. limit $= 3$

2. limit $= \dfrac{3}{8}$

3. limit $= 8$

4. limit $= \dfrac{8}{3}$

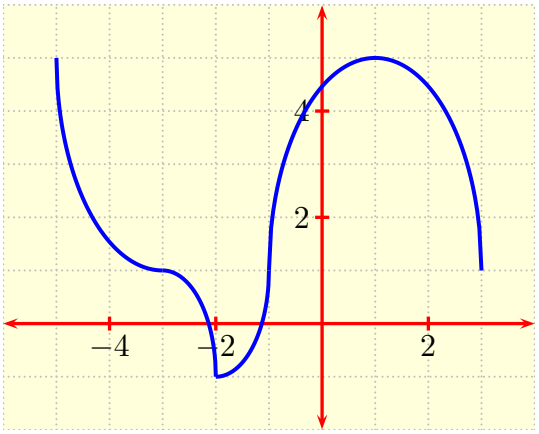
5. limit does not exist

6. limit $= 0$

---

013 10.0 points

If f is a continuous function on $(-5, 3)$ whose graph is



which of the following properties are satisfied?

A. f has exactly 3 local extrema,

B. $f''(x) > 0$ on $(-5, -3)$,

C. f has exactly 4 critical points.

1. B and C only

2. A and B only

3. B only

4. A only

5. C only

6. A and C only

7. all of them

8. none of them

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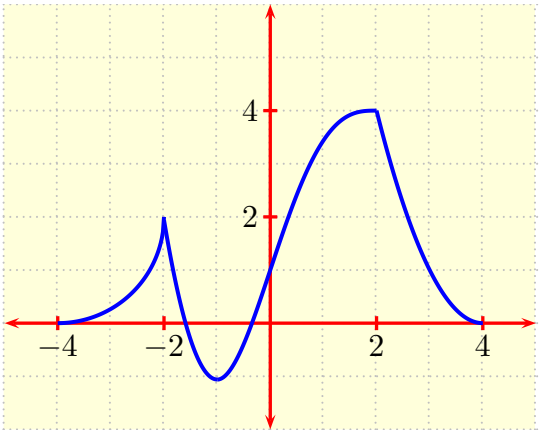
014 10.0 points

If f is a continuous function on $(-4, 4)$ whose graph is



which one of the following properties is NOT satisfied?

1. $(0, 1)$ is an inflection point

2. $f''(x) < 0$ on $(0, 2)$

3. f has exactly 1 local maximum

4. $f'(x) < 0$ on $(2, 4)$

5. $f''(x) > 0$ on $(-4, -2)$

6. f has exactly 3 critical points

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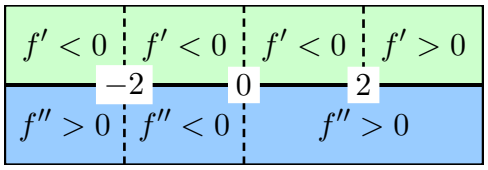
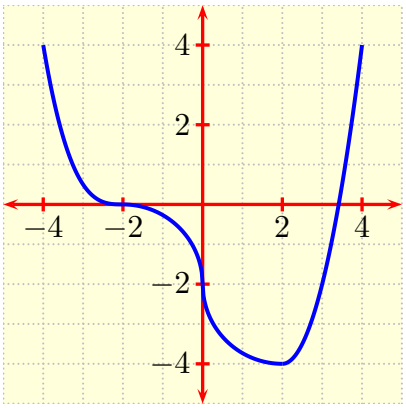
015 10.0 points

If f is a function on $(-4, 4)$ having exactly one critical point and the sign of f', f'' are given in



decide which of the following could be the graph of f.

1.



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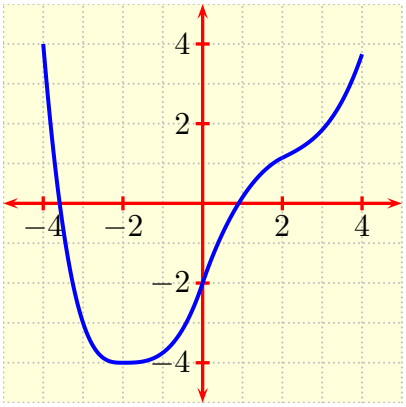

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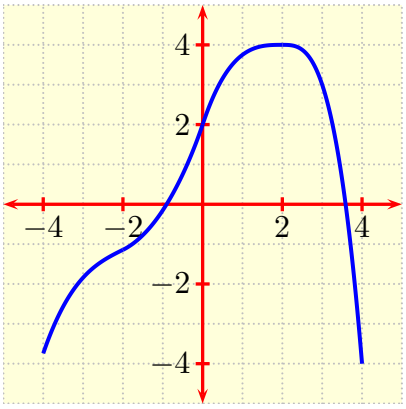

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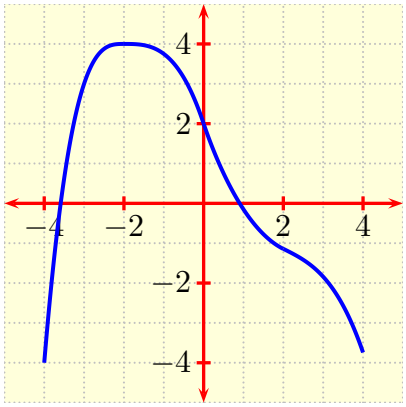

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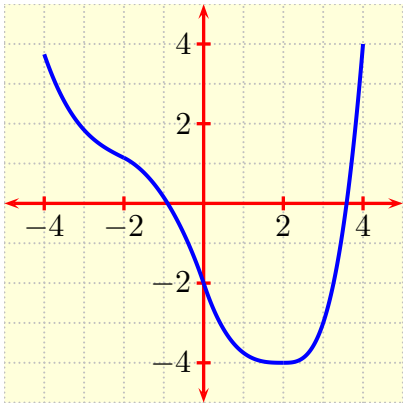

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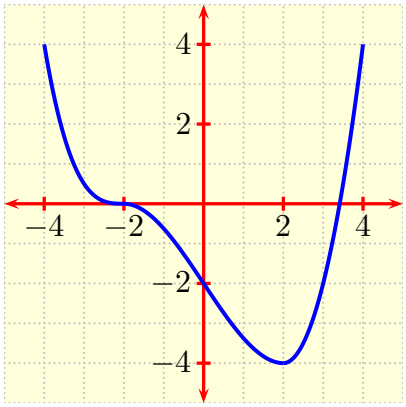

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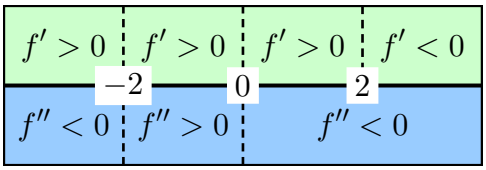
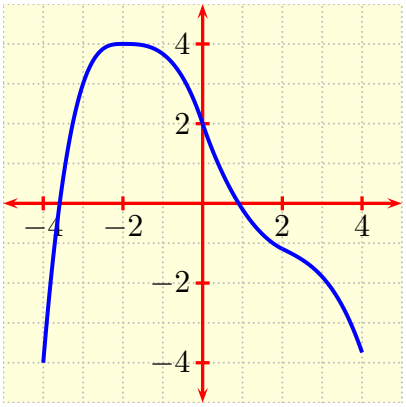
016 10.0 points

If f is a function on $(-4, 4)$ having exactly one critical point and the sign of f', f'' are given in



decide which of the following could be the graph of f.

1.



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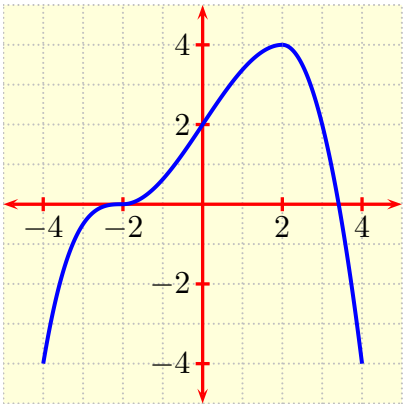

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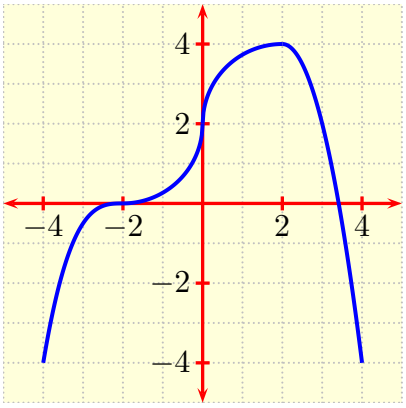

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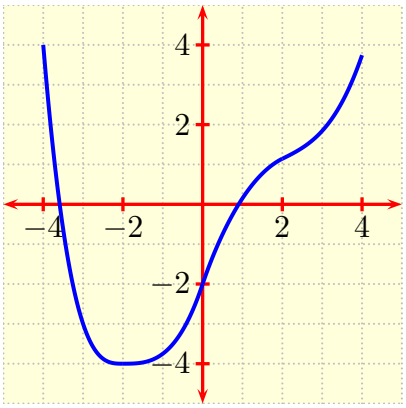

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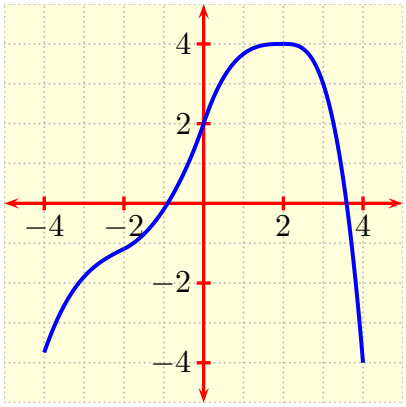

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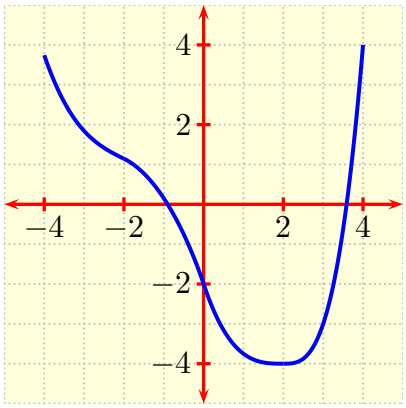

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017 10.0 points

If f is a continuous function on $(-4,\ 4)$ such that

(i) f has 3 critical points,

(ii) f has 1 local maximum,

(iii) $f''(x) > 0$ on $(-4,\ -2)$,

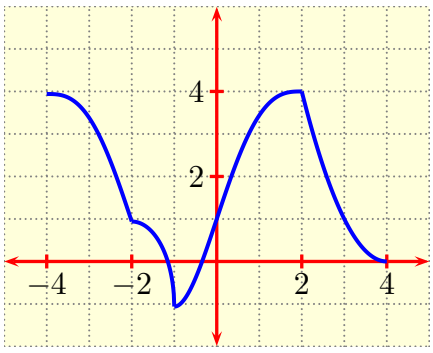
(iv) $f''(x) < 0$ on $(0,\ 2)$,

(v) $(0,\ 1)$ is an inflection point,

(vi) $f'(x) < 0$ on $(2,\ 4)$,

which one of the following could be the graph of f?

1.



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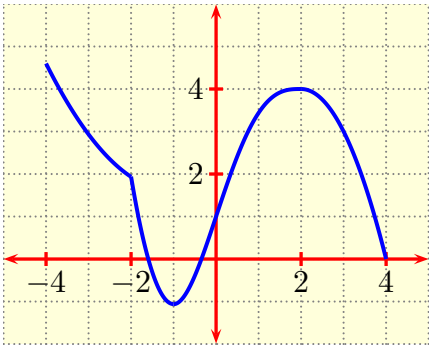
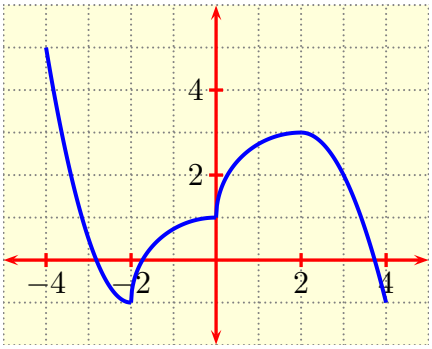
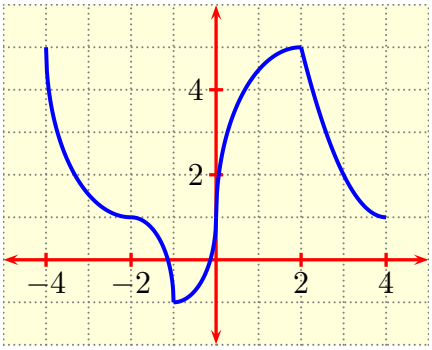


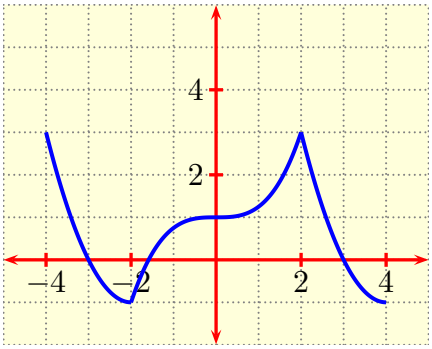
3.



4.



5.



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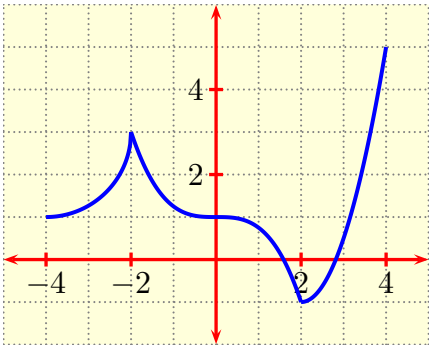

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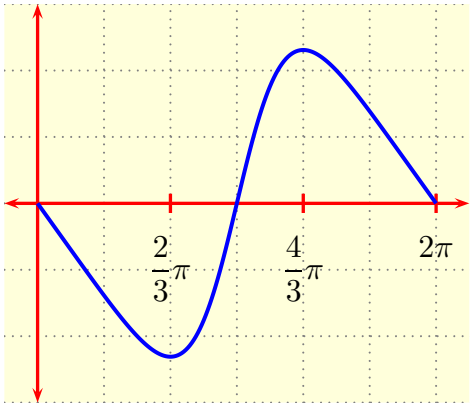
018 10.0 points

Which function could have



as its graph on $[0, 2\pi]$?

1. $f(x) = \sin x$

2. $f(x) = \dfrac{\sin x}{\cos x - 2}$

3. $f(x) = -\dfrac{\sin x}{2 + \cos x}$

4. $f(x) = \dfrac{\sin x}{2 + \cos x}$

5. $f(x) = -\sin x$

6. $f(x) = \dfrac{\sin x}{2 - \cos x}$

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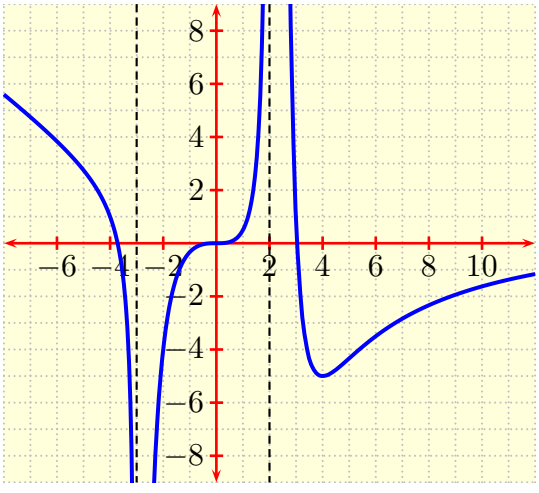
019 10.0 points

A certain function f is known to have



as its graph on $(-8, 12)$. Based on this graph, which of the following is a true statement about the critical and inflection points of f?

1. f has exactly three critical points and two inflection points

2. f has exactly one critical point and two inflection points

3. f has exactly one critical point and one inflection points

4. f has exactly two critical points and one inflection point

5. f has exactly two critical points and two inflection points

---

020 10.0 points

A function f is continuous and twice-differentiable for all $x \neq 1$. Its derivatives have the properties

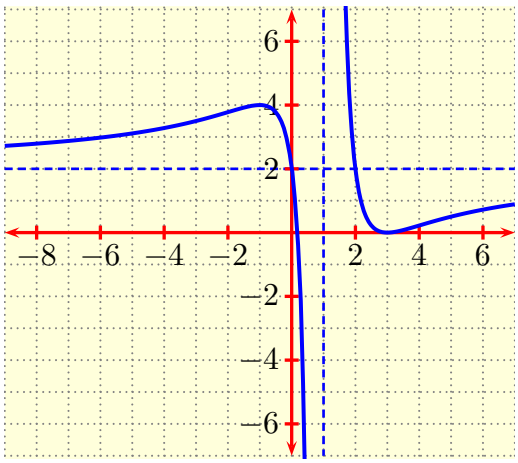
(i) $f'(-1) = 0$,

(ii) $f'' > 0$ on $(-\infty, -2) \bigcup (1, \infty)$,

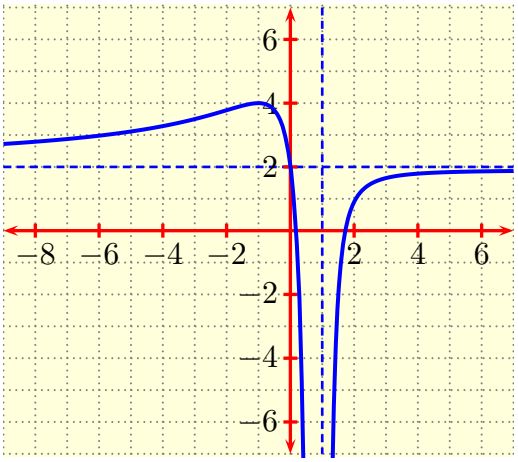
(iii) $f'' < 0$ on $(-2, 1)$.

If the lines $x = 1$ and $y = 2$ are asymptotes of the graph of f, which of the following could be the graph of f?

1.



2.


6
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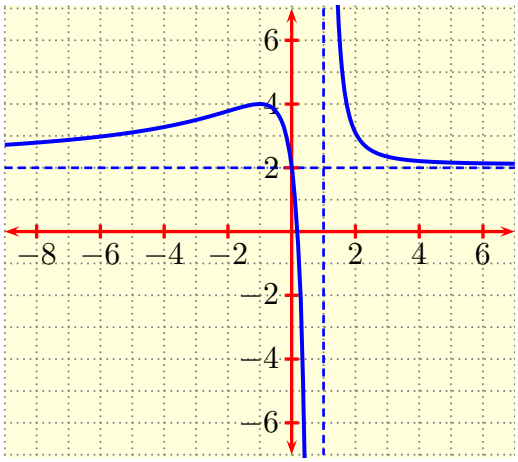
2
−8 −6 −4 −2 2 4 6
−2
−4
−6

5.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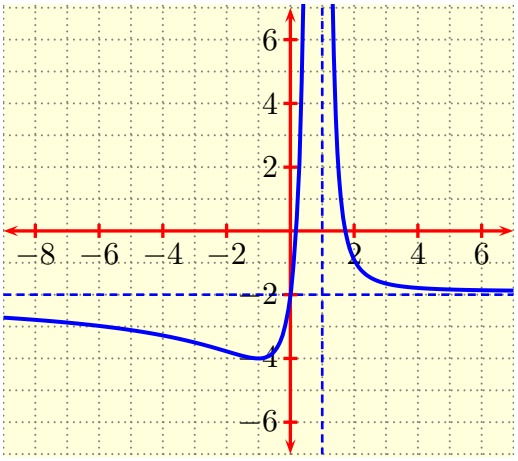
−2
−4
−6

3.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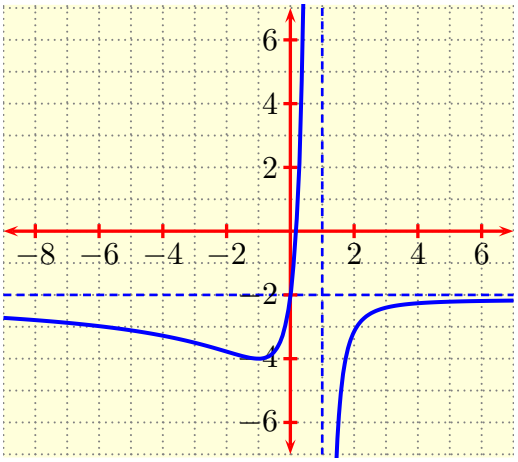
−4
−6

4.


6
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2
−8 −6 −4 −2 2 4 6
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−6