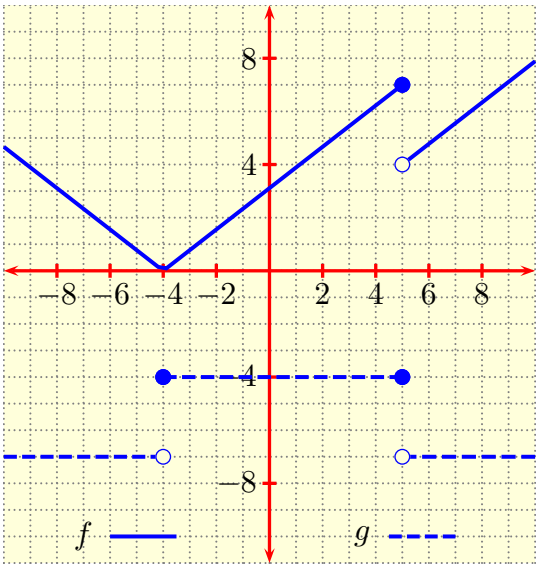
This print-out should have 33 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Functions f and g are defined on $(-10, 10)$ by their respective graphs in



Find all values of x where the product, fg, of f and g is continuous, expressing your answer in interval notation.

1. $(-10, -4) \bigcup (-4, 10)$

2. $(-10, -4) \bigcup (-4, 5) \bigcup (5, 10)$

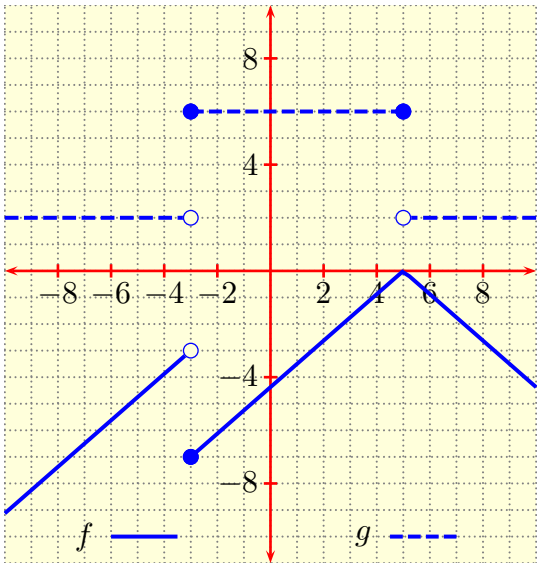
3. $(-10, -4] \bigcup [5, 10)$

4. $(-10, 5) \bigcup (5, 10)$

5. $(-10, 10)$

002 10.0 points

Functions f and g are defined on $(-10, 10)$ by their respective graphs in



Find all values of x where the sum, $f + g$, of f and g is continuous, expressing your answer in interval notation.

1. $(-10, 5) \bigcup (5, 10)$

2. $(-10, -3) \bigcup (-3, 10)$

3. $(-10, 10)$

4. $(-10, -3) \bigcup (-3, 5) \bigcup (5, 10)$

5. $(-10, -3] \bigcup [5, 10)$

003 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. $f(3) = 3$

3. $f(3) = 6$

4. $f(3) = -6$

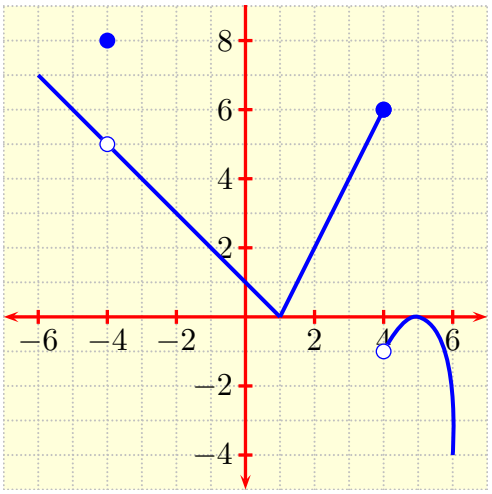
5. $f(3) = -9$

6. $f(3) = 9$

---

004 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. none of the other answers

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

3. no values of x

4. $x = 4$

5. $x = -4$

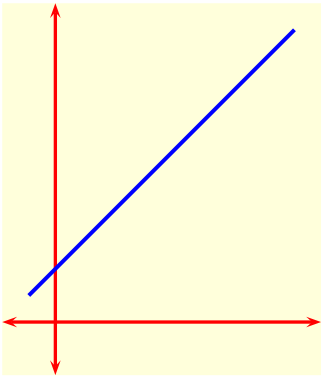
---

005 10.0 points

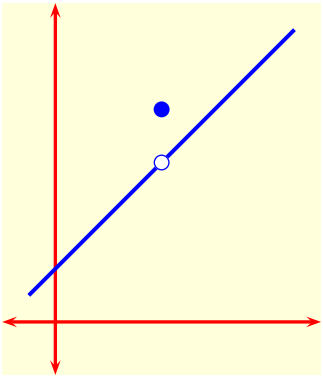
Determine which of the following could be the graph of f near the origin when

$$f(x) = \begin{cases} \dfrac{x^2 - 7x + 10}{2 - x}\,, & x \neq 2, \\ 4\,, & x = 2. \end{cases}$$

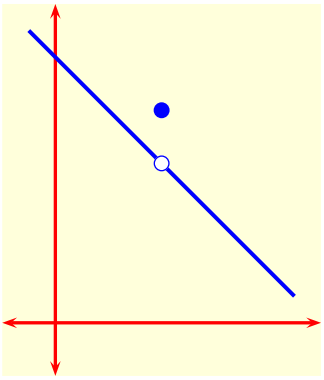
1.



2.



3.



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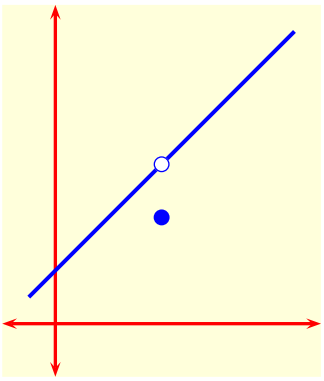

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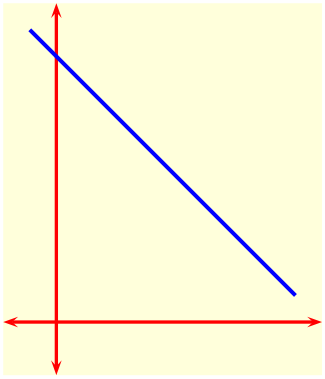

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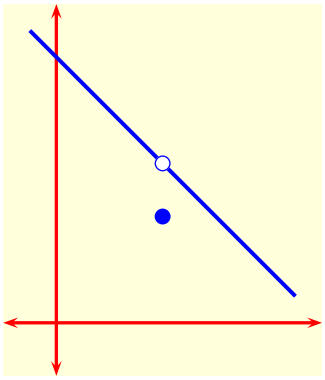

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006 10.0 points

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

$$f(x) = \frac{x-4}{x^2-x-12}$$

is continuous, expressing your answer in interval notation.

1. $(-\infty, -3) \cup (-3, -4) \cup (-4, \infty)$

2. $(-\infty, 4) \cup (4, \infty)$

3. $(-\infty, -3) \cup (-3, 4) \cup (4, \infty)$

4. $(-\infty, -4) \cup (-4, 3) \cup (3, \infty)$

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

---

007 10.0 points

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

$$f(x) = \begin{cases} \dfrac{x^2-x-30}{x^2-10x+24}, & x \neq 6, \\ 6, & x = 6, \end{cases}$$

is continuous, expressing your answer in interval notation.

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

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

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

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

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

---

008 10.0 points

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

$$f(x) = \frac{x-8}{x^2+1}$$

is not continuous?

1. no values of x

2. $x = 1$

3. $x = -1, 1$

4. $x = 8$

5. $x = -1, 8$

6. $x = -1$

---

009 10.0 points

Determine where

$$f(x) = \begin{cases} 2-x, & x \leq -2, \\ x^2, & -2 < x < 4, \\ 12+x, & x \geq 4. \end{cases}$$

is continuous, expressing your answer in interval notation.

1. $(-\infty, -2) \cup (-2, \infty)$

2. $(-\infty, -2) \cup (-2, 4) \cup (4, \infty)$

3. $(-\infty, -2) \cup (4, \infty)$

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

5. $(-\infty, \infty)$

---

010 10.0 points

If the function f defined by

$$f(x) = \begin{cases} cx + 6\,, & x < 2\,, \\ 3x^2 - 2\,, & x \geq 2\,, \end{cases}$$

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

1. $f(1) = 4$

2. $f(1) = 6$

3. $f(1) = 5$

4. $f(1) = 8$

5. $f(1) = 7$

---

011 10.0 points

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

$$g(x) = \begin{cases} x^2 - 2x - c^2, & x > 2, \\ cx - 15, & x \leq 2, \end{cases}$$

is continuous for all x.

1. $c = 5$

2. none of these

3. $c = -8$

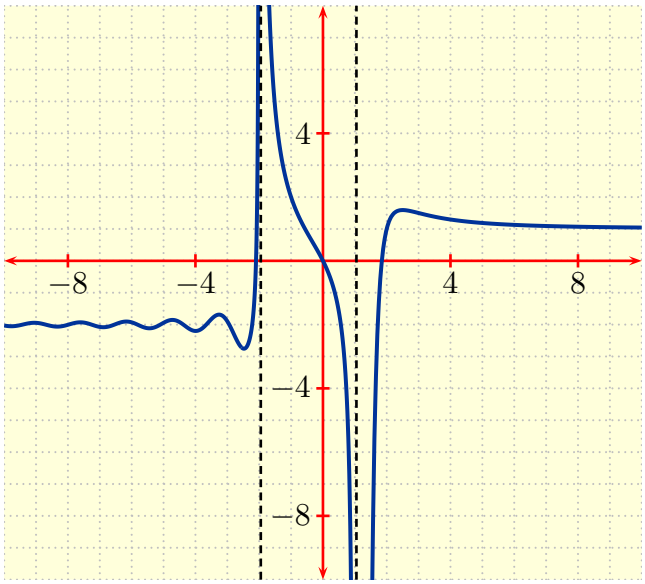
4. $c = 8$

5. $c = -5$

---

012 (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 $= -1$

2. limit $= 2$

3. limit does not exist

4. limit $= -2$

5. limit $= 1$

---

013 (part 2 of 3) 10.0 points

(ii) What is the value of

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

1. limit $= -1$

2. limit $= -2$

3. limit $= 2$

4. limit does not exist

5. limit $= 1$

014 (part 3 of 3) 10.0 points

(iii) What is the value of

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

1. limit $= 1$

2. limit $= \infty$

3. limit $= 2$

4. limit $= -2$

5. limit $= -1$

015 10.0 points

Determine if the limit

$$\lim_{x \to \infty} \frac{4x + 3}{x^2 - 3x + 2}$$

exists, and if it does, find its value.

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

2. limit doesn't exist

3. limit $= 2$

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

5. limit $= 0$

6. limit $= 3$

016 10.0 points

Determine if

$$\lim_{x \to \infty} \frac{x^3 - 3x}{3x^3 + 5x^2 + 1}$$

exists, and if it does, find its value.

1. limit $= 1$

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

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

4. limit $= -\dfrac{1}{3}$

5. limit does not exist

6. limit $= 0$

017 10.0 points

Determine if the limit

$$\lim_{x \to -\infty} \frac{1 + 3x + 3x^3}{3 - 2x^3}$$

exists, and if it does, find its value.

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

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

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

4. limit does not exist

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

018 10.0 points

Determine if the limit

$$\lim_{x \to -\infty} \frac{\sqrt{x^2 + 3x}}{3x + 5}$$

exists, and if it does, find its value.

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

2. limit $= -1$

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

4. limit $= -\dfrac{1}{3}$

5. limit $= 1$

6. limit does not exist

7. limit $= -\dfrac{3}{5}$

---

019 10.0 points

Determine if

$$\lim_{x\to\infty}\left(\sqrt{9x^2+4}-3x\right)$$

exists, and if it does, find its value.

1. limit doesn't exist

2. limit $= \sqrt{7}$

3. limit $= 3$

4. limit $= 0$

5. limit $= \sqrt{12}$

---

020 10.0 points

Determine if

$$\lim_{x\to\infty} x\left(\sqrt{x^2+3}-x\right)$$

exists, and if it does, find its value.

1. limit does not exist

2. limit $= 1$

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

4. limit $= 2$

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

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

---

021 10.0 points

Find the value of

$$\lim_{x\to\infty}\frac{2+3x+2x^4}{3-5x^3}\,.$$

1. limit $= 0$

2. none of the other answers

3. limit $= \infty$

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

5. limit $= -\infty$

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

---

022 10.0 points

Find an expression for the slope of the secant line through the points $P(7, g(7))$ and $Q(x, g(x))$ on the graph of $y = g(x)$.

1. slope $= \dfrac{g(x)+g(7)}{7-x}$

2. slope $= \dfrac{g(x)-g(7)}{7+x}$

3. slope $= \dfrac{g(x)-g(7)}{x-7}$

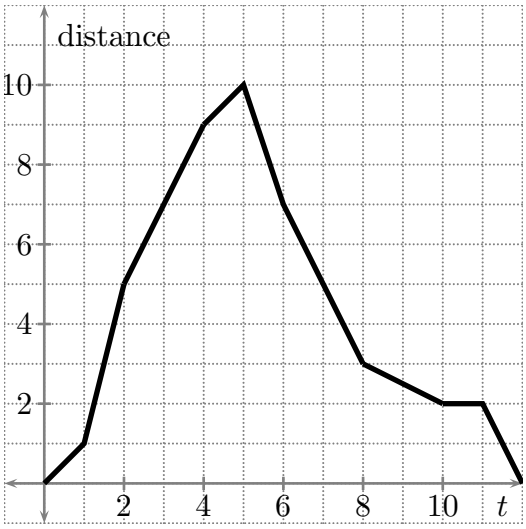
4. slope $= \dfrac{g(7)+g(x)}{7+x}$

5. slope $= \dfrac{g(7)-g(x)}{x-7}$

---

023 (part 1 of 3) 10.0 points

A Calculus student leaves the RLM building and walks in a straight line to the PCL Library. His distance (in multiples of 40 yards) from RLM after t minutes is given by the graph



i) What is his speed after 3 minutes, and in what direction is he heading at that time?

1. away from RLM at 40 yds/min

2. towards RLM at 40 yds/min

3. towards RLM at 80 yds/min

4. away from RLM at 80 yds/min

5. away from RLM at 60 yds/min

---

024 (part 2 of 3) 10.0 points

ii) What is his speed after 9 minutes, and in what direction is he heading at that time?

1. away from RLM at 10 yds/min.

2. away from RLM at 20 yds/min.

3. towards RLM at 20 yds/min.

4. away from RLM at 5 yds/min.

5. towards RLM at 40 yds/min

---

025 (part 3 of 3) 10.0 points

iii) How far is he from RLM when he turns back?

1. distance = 200 yards

2. distance = 300 yards

3. distance = 350 yards

4. distance = 400 yards

5. distance = 250 yards

---

026 10.0 points

If f is a differentiable function, then $f'(a)$ is given by which of the following?

I. $\lim_{h \to 0} \dfrac{f(a+h) - f(a)}{h}$

II. $\lim_{x \to a} \dfrac{f(x) - f(a)}{x - a}$

III. $\lim_{x \to a} \dfrac{f(x+h) - f(x)}{h}$

1. I, II, and III

2. I and III only

3. I only

4. I and II only

5. II only

---

027 10.0 points

If f is a differentiable function, then $f'(a)$ is given by which of the following without further restriction on f?

$A.$ $\lim_{h \to 0} \dfrac{f(a+h) - f(a)}{h}$,

$B.$ $\lim_{x \to a} \dfrac{f(x) - f(a)}{x - a}$,

$C.$ $\lim_{x \to a} \dfrac{f(x+h) - f(x)}{h}$.

1. B only

2. A only

3. A and C only

4. A and B only

5. A, B, and C

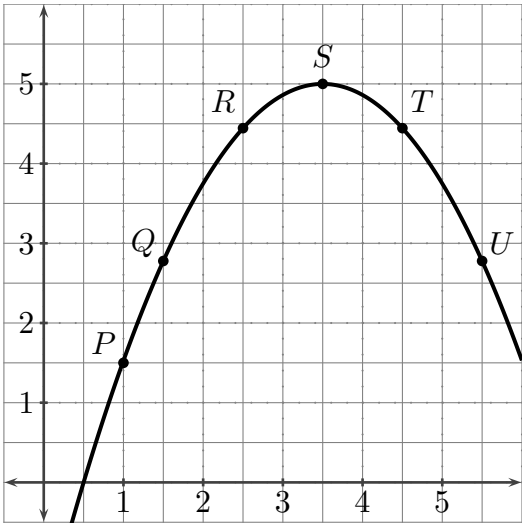
---

028 10.0 points

What is the significance of the expression

$$\frac{f(1+h)-f(1)}{h}$$

in the following graph of f when $h = \frac{1}{2}$?



1. length of line segment $\overline{PT}$

2. slope of line through P and T

3. equation of line through P and Q

4. equation of line through P and R

5. slope of tangent line at P

6. length of line segment $\overline{PQ}$

7. equation of line through P and T

8. slope of line through P and Q

9. slope of line through P and R

10. length of line segment $\overline{PR}$

---

029 10.0 points

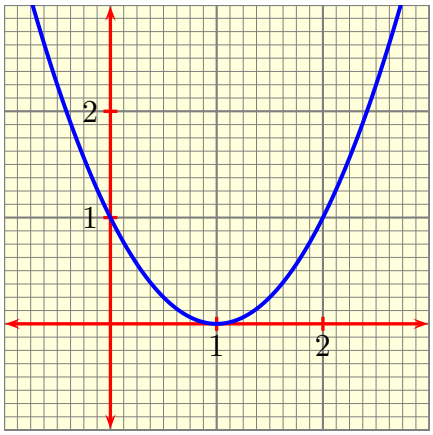
Sketch the graph of a function g for which

$$g(0) = 1, \qquad g'(0) = 2,$$

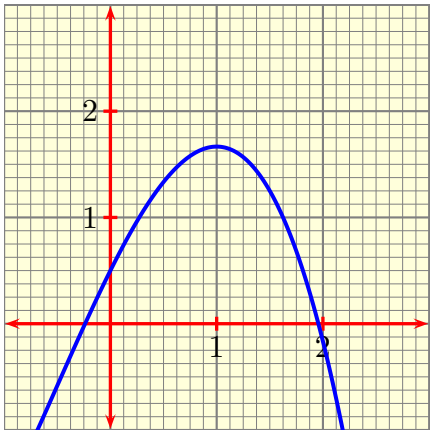
while

$$g'(1) = 0, \qquad g'(2) = -2\,.$$

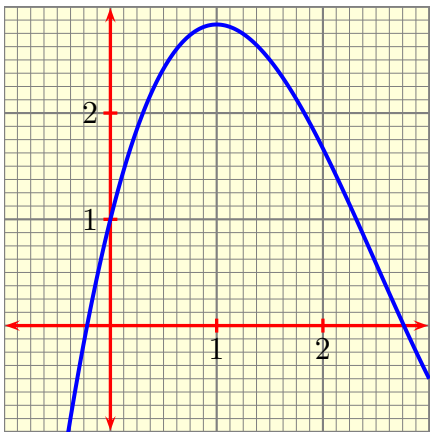
1.



2.



3.



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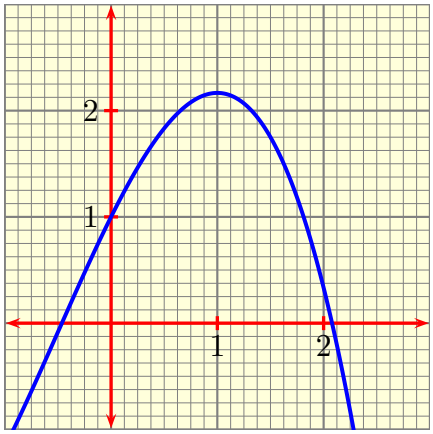

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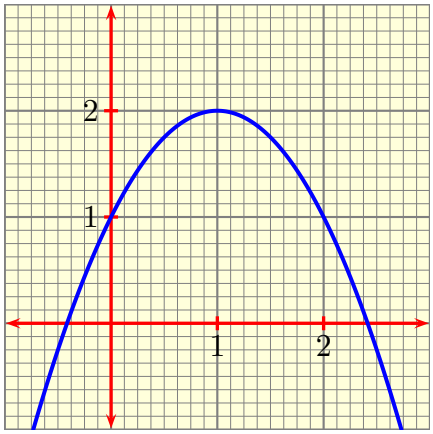

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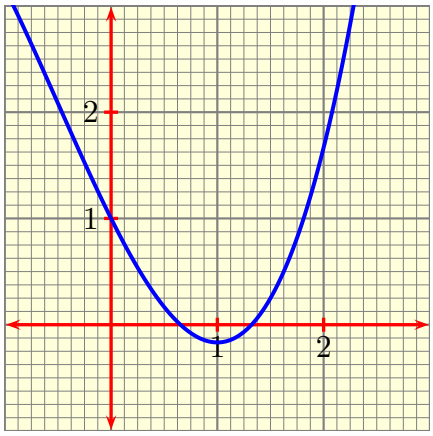

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030 10.0 points

Find the value of $f'(1)$ when

$$f(x) = \sqrt{x+3}\,.$$

1. $f'(1) = -\dfrac{1}{2}$

2. $f'(1) = -\dfrac{1}{4}$

3. $f'(1) = \dfrac{1}{4}$

4. $f'(1) = \dfrac{1}{2}$

5. $f'(1) = \dfrac{2}{2}$

6. $f'(1) = -2$

---

031 10.0 points

For which of the following functions f and corresponding numbers a is the limit

$$\lim_{h\to 0} \frac{(1+h)^9 - 1}{h}$$

the value of $f'(a)$?

1. $f(x) = x^9, \quad a = 0$

2. $f(x) = x^9, \quad a = 1$

3. $f(x) = (x+1)^9, \quad a = 1$

4. $f(x) = x^9, \quad a = 9$

5. $f(x) = (x-1)^9, \quad a = 1$

6. $f(x) = (x+1)^9, \quad a = 9$

---

032 10.0 points

For what function f and number a is the limit

$$\lim_{h\to 0} \frac{\sqrt[5]{32+h} - 2}{h}$$

the value of $f'(a)$?

1. $f(x) = \dfrac{1}{x}, \quad a = 2$

2. $f(x) = x, \quad a = 2$

3. $f(x) = x^{1/5}, \quad a = 32$

4. $f(x) = x^5, \quad a = \dfrac{1}{32}$

5. $f(x) = \dfrac{1}{x^5}, \quad a = 32$

6. $f(x) = x^{1/5}, \quad a = 2$

---

033 10.0 points

For what function f and number a is the limit

$$\lim_{x \to 4} \frac{2^x - 16}{x - 4}$$

the value of $f'(a)$?

1. $f(x) = 1/x^4, \quad a = 1/16$

2. $f(x) = 2^x, \quad a = 16$

3. $f(x) = 2^x, \quad a = 4$

4. $f(x) = x^4, \quad a = 2$

5. $f(x) = 2^4, \quad a = 2$

6. $f(x) = 2^{1/x}, \quad a = 4$