This print-out should have 46 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Determine

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

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

2. limit $= 1$

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

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

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

6. limit $= -1$

002 10.0 points

When f is the function defined by

$$f(x) = \begin{cases} 3x - 4, & x \le 4 , \\ 2x - 1, & x > 4 , \end{cases}$$

determine if

$$\lim_{x \to 4^+} f(x)$$

exists, and if it does, find its value.

1. limit $= 9$

2. limit $= 5$

3. limit does not exist

4. limit $= 6$

5. limit $= 8$

6. limit $= 7$

003 10.0 points

Consider the function

$$f(x) = \begin{cases} 3 - x, & x < -1 \\ x, & -1 \le x < 3 \\ (x-1)^2, & x \ge 3 . \end{cases}$$

Find all the values of a for which the limit

$$\lim_{x \to a} f(x)$$

exists, expressing your answer in interval notation.

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

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

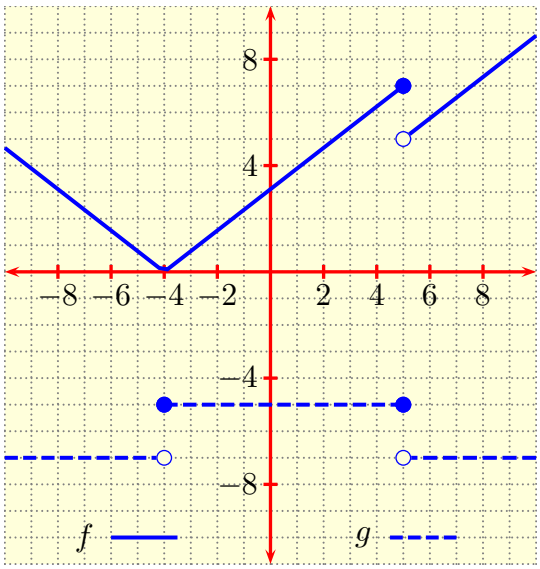
3. $(-\infty, 3) \cup (3, \infty)$

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

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

004 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. $(-10, 5) \bigcup (5, 10)$

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

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

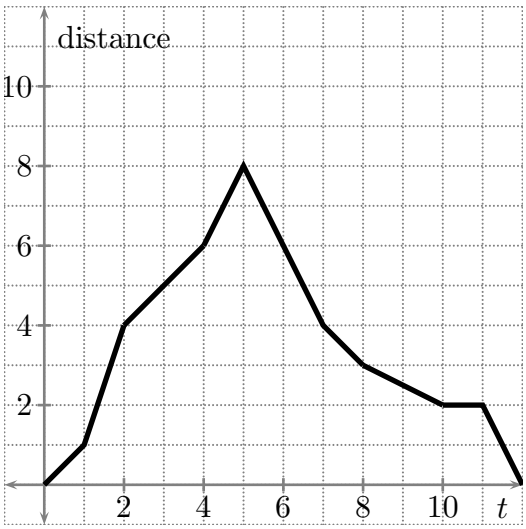
4. $(-10, 10)$

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

---

005 (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 30 yds/min

2. away from RLM at 40 yds/min

3. away from RLM at 20 yds/min

4. towards RLM at 20 yds/min

5. towards RLM at 40 yds/min

---

006 (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. towards RLM at 40 yds/min

2. away from RLM at 5 yds/min.

3. away from RLM at 10 yds/min.

4. away from RLM at 20 yds/min.

5. towards RLM at 20 yds/min.

---

007 (part 3 of 3) 10.0 points

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

1. distance = 320 yards

2. distance = 160 yards

3. distance = 200 yards

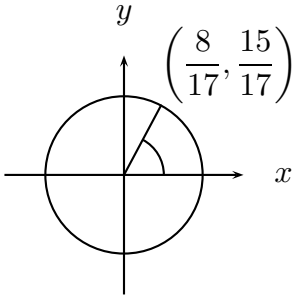
4. distance = 240 yards

5. distance = 280 yards

---

008 (part 1 of 6) 10.0 points

Consider the angle t defined by the point $\left(\frac{8}{17}, \frac{15}{17}\right)$



on the unit circle.
Find $\sin(t)$.

1. $\frac{8}{15}$

2. None of these

3. $\frac{17}{15}$

4. $\frac{17}{8}$

5. $\frac{8}{17}$

6. $\frac{15}{8}$

7. $\frac{15}{17}$

---

009 (part 2 of 6) 10.0 points

Find $\cos(t)$.

1. $\frac{17}{8}$

2. $\frac{15}{17}$

3. $\frac{8}{15}$

4. None of these

5. $\frac{8}{17}$

6. $\frac{17}{15}$

7. $\frac{15}{8}$

---

010 (part 3 of 6) 10.0 points

Find $\tan(t)$.

1. $\frac{8}{17}$

2. None of these

3. $\frac{8}{15}$

4. $\frac{17}{15}$

5. $\frac{15}{17}$

6. $\frac{17}{8}$

7. $\frac{15}{8}$

---

011 (part 4 of 6) 10.0 points

Find $\csc(t)$.

1. $\frac{17}{15}$

2. $\frac{8}{15}$

3. $\frac{8}{17}$

4. None of these

5. $\frac{17}{8}$

6. $\frac{15}{8}$

7. $\frac{15}{17}$

---

012 (part 5 of 6) 10.0 points

Find $\sec(t)$.

1. $\frac{15}{8}$

2. None of these

3. $\frac{15}{17}$

4. $\frac{8}{15}$

5. $\frac{17}{15}$

6. $\frac{17}{8}$

7. $\frac{8}{17}$

---

013 (part 6 of 6) 10.0 points

Find $\cot(t)$.

1. $\frac{17}{15}$

2. $\frac{8}{15}$

3. $\frac{8}{17}$

4. $\frac{15}{17}$

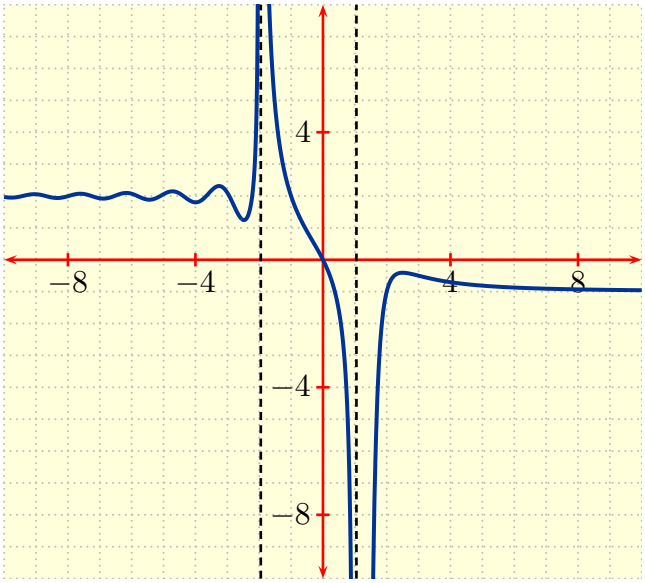
5. None of these

6. $\frac{15}{8}$

7. $\frac{17}{8}$

014 (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 $= 1$

5. limit $= 2$

015 (part 2 of 3) 10.0 points

(ii) What is the value of

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

1. limit does not exist

2. limit $= 1$

3. limit $= -1$

4. limit $= -2$

5. limit $= 2$

016 (part 3 of 3) 10.0 points

(iii) What is the value of

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

1. limit $= -2$

2. limit $= -1$

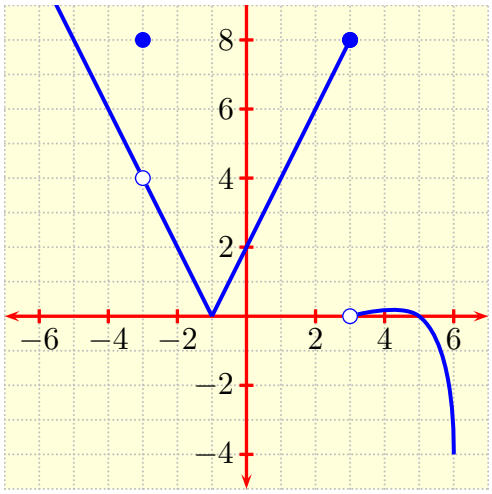
3. limit $= 2$

4. limit $= \infty$

5. limit $= 1$

017 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. $x = -3\,, 3$

2. none of the other answers

3. no values of x

4. $x = 3$

5. $x = -3$

---

018 (part 1 of 3) 10.0 points

Determine the value of

$$\lim_{x \to 5+} \frac{x-6}{x-5}\,.$$

1. limit $= \infty$

2. limit $= -\infty$

3. none of the other answers

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

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

---

019 (part 2 of 3) 10.0 points

Determine the value of

$$\lim_{x \to 5-} \frac{x-6}{x-5}\,.$$

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

2. none of the other answers

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

4. limit $= -\infty$

5. limit $= \infty$

---

020 (part 3 of 3) 10.0 points

Determine the value of

$$\lim_{x \to 5} \frac{x-6}{x-5}\,.$$

1. limit $= -\infty$

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

3. limit $= \infty$

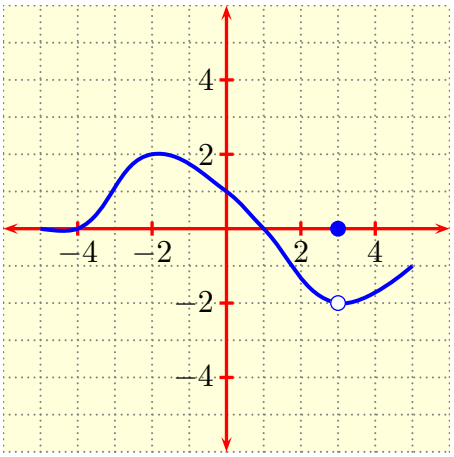
4. limit $= -\dfrac{6}{5}$

5. none of the other answers

---

021 10.0 points

Below is the graph of a function f.



Use the graph to determine $\lim_{x \to 3} f(x)$.

1. limit $= 0$

2. does not exist

3. limit $= 1$

4. limit $= -2$

5. limit $= -1$

---

022 10.0 points

Find the value of

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

1. none of the other answers

2. limit $= -\infty$

3. limit $= \infty$

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

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

6. limit $= 0$

---

023 (part 1 of 3) 10.0 points

If $t = \dfrac{\pi}{4}$, evaluate (if possible)

a) $\sin t$

1. $\dfrac{1}{2}$

2. $-\dfrac{\sqrt{3}}{2}$

3. 1

4. None of these

5. $\dfrac{\sqrt{3}}{2}$

6. $\dfrac{1}{\sqrt{2}}$

7. 0

---

024 (part 2 of 3) 10.0 points

b) $\cos t$

1. 0

2. -1

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

4. None of these

5. $\dfrac{\sqrt{3}}{2}$

6. $-\dfrac{\sqrt{3}}{2}$

7. $\dfrac{1}{\sqrt{2}}$

---

025 (part 3 of 3) 10.0 points

c) $\tan t$

1. -1

2. $-\dfrac{\sqrt{3}}{2}$

3. None of these

4. $\dfrac{1}{2}$

5. 0

6. 1

7. $\dfrac{\sqrt{3}}{2}$

---

026 10.0 points

Determine where

$$f(x) = \begin{cases} 20 - x, & x \le -5, \\ x^2, & -5 < x < 2, \\ 2 + x, & x \ge 2. \end{cases}$$

is continuous, expressing your answer in interval notation.

1. $(-\infty, -5) \cup (2, \infty)$

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

3. $(-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

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

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

---

027 10.0 points

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

$$g(x) = \begin{cases} x^2 + x - c^2, & x > -1, \\ cx - 12, & x \le -1, \end{cases}$$

is continuous for all x.

1. $c = 7$

2. $c = -3$

3. $c = 3$

4. none of these

5. $c = -7$

---

028 10.0 points

Find the solution of the exponential equation

$$3^{2x} = 9^{\frac{5}{2}x-3}.$$

1. none of these

2. $x = 3$

3. $x = -2$

4. $x = 2$

5. $x = -3$

---

029 10.0 points

Let F be the function defined by

$$F(x) = \frac{x^2-4}{|x-2|}.$$

Determine if

$$\lim_{x \to 2^-} F(x)$$

exists, and if it does, find its value.

1. limit $= 2$

2. limit $= -2$

3. limit $= 4$

4. limit does not exist

5. limit $= -4$

---

030 10.0 points

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

$$f(x) = \frac{x-6}{x^2-4x-12}$$

is continuous, expressing your answer in interval notation.

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

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

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

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

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

---

031 10.0 points

Find the value of

$$\lim_{x \to 3} \frac{2x-6}{\sqrt{x}-\sqrt{3}}$$

if the limit exists.

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

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

3. limit $= 12$

4. limit $= 6\sqrt{3}$

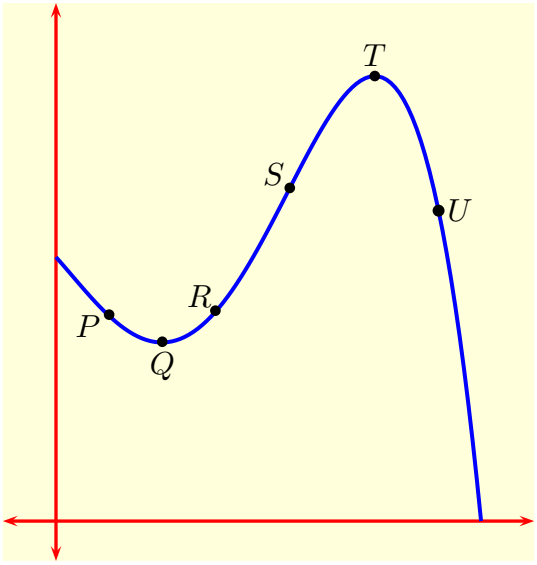
5. limit $= 4\sqrt{3}$

6. limit does not exist

---

032 (part 1 of 5) 10.0 points

At which point on the graph



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

1. S

2. P

3. R

4. U

5. T

6. Q

---

033 (part 2 of 5) 10.0 points

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

1. U

2. S

3. P

4. R

5. T

6. Q

---

034 (part 3 of 5) 10.0 points

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

1. P

2. T

3. U

4. Q

5. R

6. S

---

035 (part 4 of 5) 10.0 points

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

1. P

2. R

3. U

4. Q

5. T

6. S

---

036 (part 5 of 5) 10.0 points

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

1. S

2. P

3. R

4. U

5. Q

6. T

---

037 10.0 points

Determine

$$\lim_{x \to 3} \left\{ \frac{1}{x-3} - \frac{3}{x^2 - 3x} \right\}.$$

1. limit does not exist

2. limit $= -3$

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

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

5. limit $= 3$

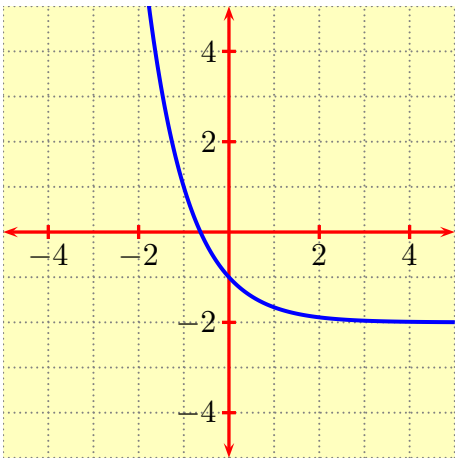
6. limit $= \frac{1}{3}$

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

---

038 10.0 points

Which function has



as its graph?

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

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

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

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

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

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

---

039 10.0 points

If the function f is continuous everywhere and

$$f(x) = \frac{x^2 - 16}{x + 4}$$

when $x \neq -4$, find the value of $f(-4)$.

1. $f(-4) = -4$

2. $f(-4) = 8$

3. $f(-4) = 16$

4. $f(-4) = -16$

5. $f(-4) = -8$

6. $f(-4) = 4$

---

040 (part 1 of 2) 10.0 points

Write the polynomial

$$1 - 2x + 8x^2 - 4x^3$$

in standard form.

a) What is its degree?

---

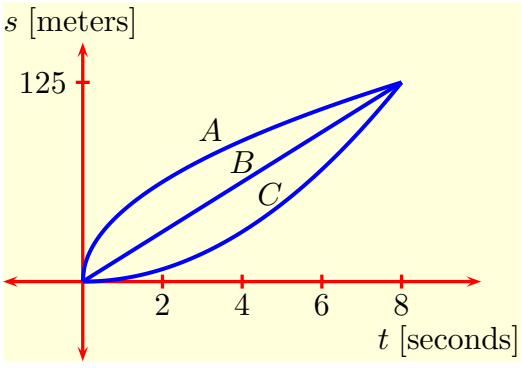
041 (part 2 of 2) 10.0 points

b) What is the leading coefficient?

---

042 10.0 points

Shown are the graphs of distance versus time for three runners A, B, and C who run a 125 -m race and finish in tie. Which of the following statements about the runners is **false**?



1. Runner C gradually speeds up throughout the race.

2. At $t = 7$, runner B has a lower velocity than runner A.

3. At $t = 1$, runner A has a higher velocity than B.

4. Runner B runs as a constant speed throughout the race.

5. Runner A gradually slows down throughout the race.

---

043 10.0 points

Find the value of

$$\lim_{x \to 2} \frac{2}{x-2}\left(1 + \frac{6}{x-8}\right)$$

if the limit exists.

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

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

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

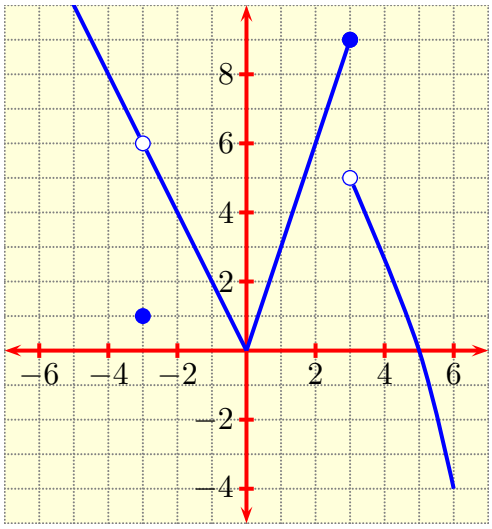
4. limit does not exist

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

---

044 10.0 points

Below is the graph of a function f.



Use the graph to determine $\lim_{x \to -3} f(x)$.

1. $\lim_{x \to -3} f(x) = 1$

2. $\lim_{x \to -3} f(x) = 9$

3. $\lim_{x \to -3} f(x) = 12$

4. $\lim_{x \to -3} f(x)$ does not exist

5. $\lim_{x \to -3} f(x) = 6$

---

045 10.0 points

Find the value of b, $b \geq 0$, for which

$$\lim_{x \to 0} \left\{ \frac{\sqrt{6x+b} - 1}{x} \right\}$$

exists.

1. $b = 3$

2. $b = 4$

3. $b = 2$

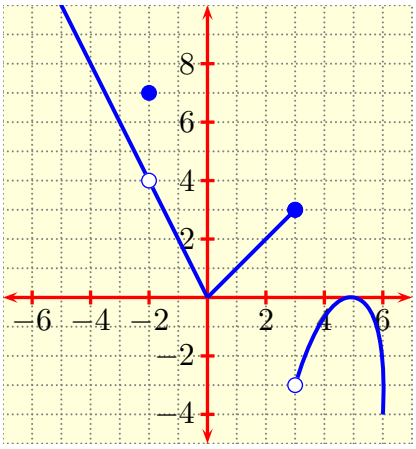
4. $b = 1$

5. $b = 0$

---

046 10.0 points

Below is the graph of a function f.



Use the graph to determine

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

1. limit does not exist

2. limit = 7

3. limit = 4

4. limit = 3

5. limit = 12