

Calculus

W 25 January 2012

RESET THE
SESSION

SET THE
PARTICIPANT
LIST

PLUG IN THE
RECEIVER

Boxed answers agree with
TurningPoint answers

Points agree with
TurningPoint points

Points total to 100

Topics covered are in bounds

limit game:

$$\lim_{x \rightarrow 8} (7x + 4) = 60$$

$$\lim_{x \rightarrow 8} \left(\frac{(7x + 4)(x - 8)}{x - 8} \right) = 60$$

Prove $\lim_{x \rightarrow 8} (7x + 4) = 60$.

limit laws (linearity, multiplicativity)

$$(d/dx)(x^3), (d/dx)(5x), (d/dx)(\sqrt{2}),$$
$$(d/dx)(x^{100})$$

compare x^{100} , s^{100} , \bullet^{100}

compare d/dx , d/ds and $'$

\sin' , \cos' , \tan' , \cot' , \sec' , \csc'

$$[\bullet^{100}]'$$

$$(fg)', (f/g)'$$

$$[d/dq][(\sin q)(q^{26} + 7^2)]$$

$$[d/dq] \left[\frac{\sin q}{q^{26} + 7^2} \right]$$

practice chain rule

tangent slopes for $y = x^3$, esp. at $x = 5$.

$$\lim_{h \rightarrow 0} \frac{(5 + h)^3 - 5^3}{h}$$

$$\lim_{\Delta x \rightarrow 0} \frac{(5 + \Delta x)^3 - 5^3}{\Delta x}$$

$$\lim_{h \rightarrow 0} \frac{|h|}{h}$$

LOOK AHEAD

differentiate polynomials

QUIZ
FOLLOWS

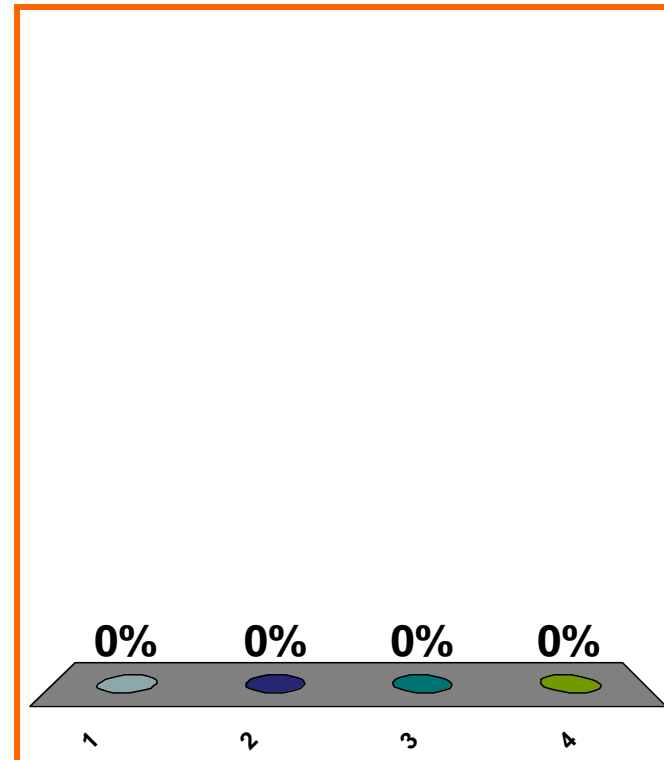
Which is a linear combination of $\sin x$ and $\cos x$?

(a) 0

(b) $2 + 8x + 7x^2$

(c) e^x

(d) none of the above



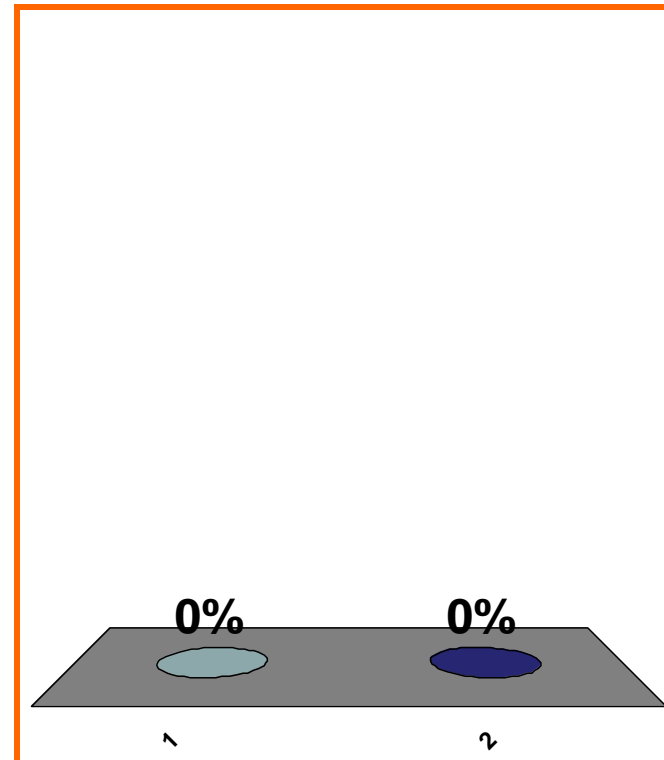
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

T or F:

$$\sqrt{(-5)^2} = -(-5)$$

(a) True

(b) False



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

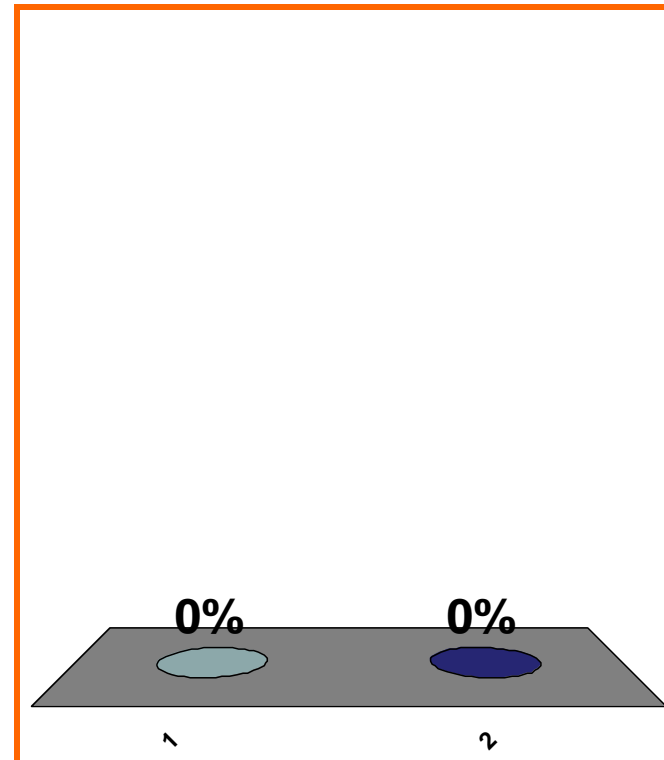
$$\sqrt{(-5)^2} = -(-5)$$

T or F:

$$\forall x \in \mathbb{R}, \sqrt{x^2} = x$$

(a) True

(b) False



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

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Topic 0010

0 pts

10

Domain of \sqrt{x} is ??

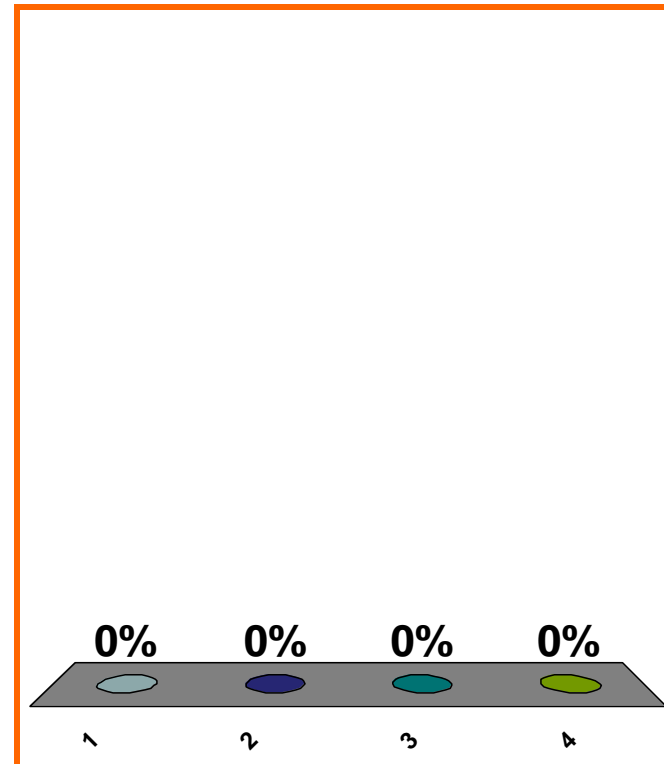
(a) $x \in \mathbb{R}$

(b) $x \in \mathbb{Q}$

(c) $x \in (0, \infty)$

(d) none of the above

Correct answer: $x \in [0, \infty)$



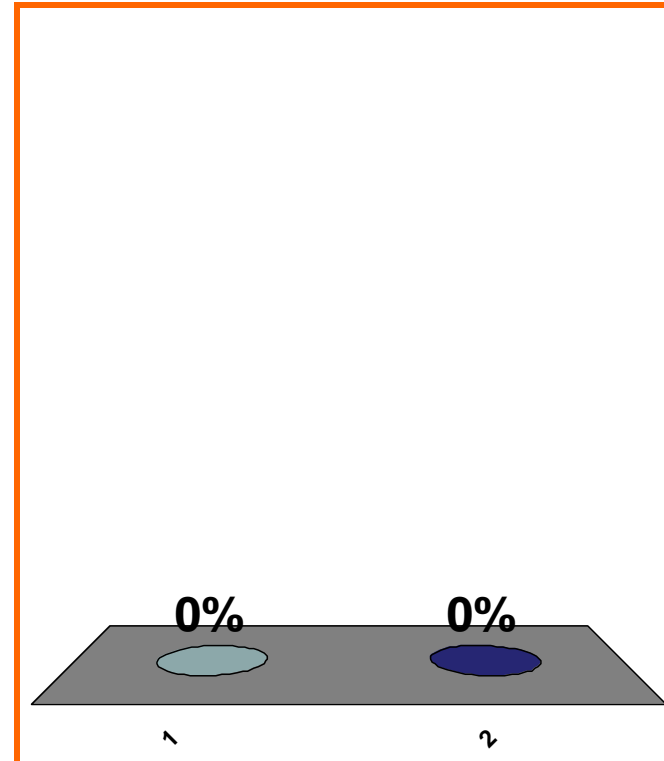
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

T or F:

$(-\infty, 5]$ is compact

(a) True

(b) False



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

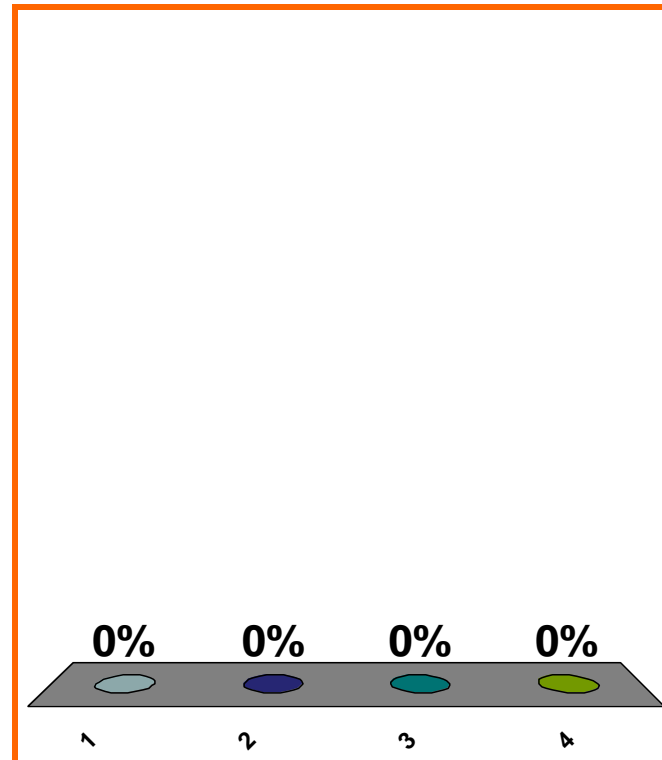
$$x^2 + 3x + 1 \text{ is } ??$$

(a) polynomial

(b) rational, **not** polynomial

(c) algebraic, **not** rational

(d) **none** of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

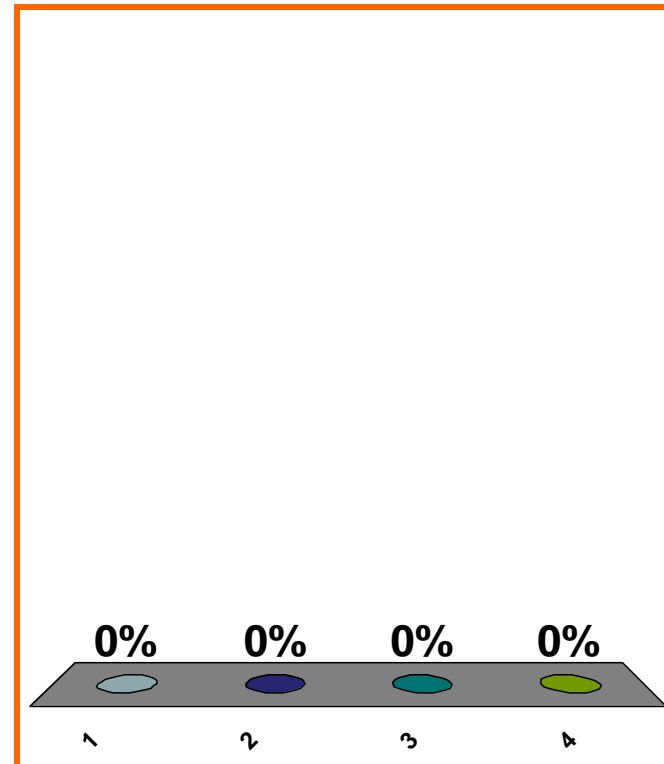
$$x^2 + 3\sqrt{x} + 1 \text{ is ??}$$

(a) polynomial

(b) rational, **not** polynomial

(c) algebraic, **not** rational

(d) **none** of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

$\sin x$ is ??

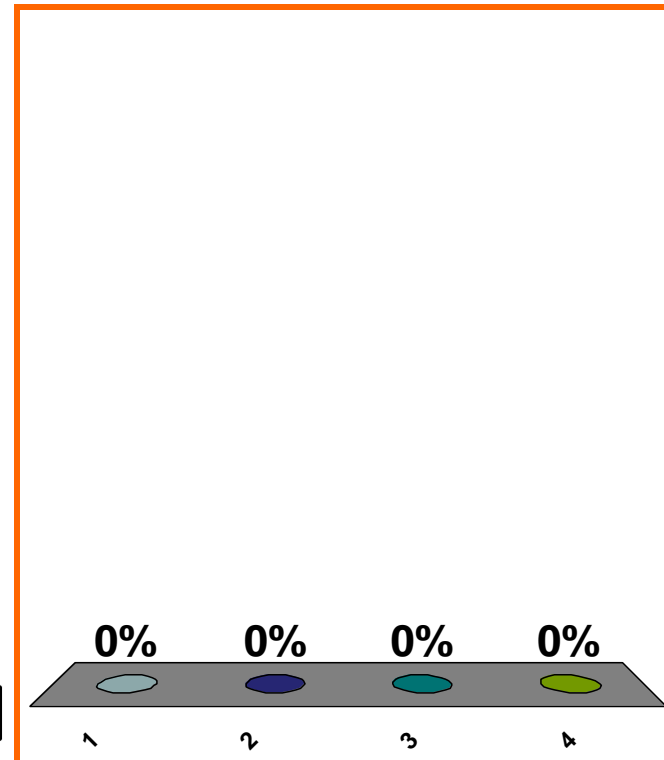
(a) polynomial

(b) rational, **not** polynomial

(c) algebraic, **not** rational

(d) **none** of the above

Correct answer: transcendental



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

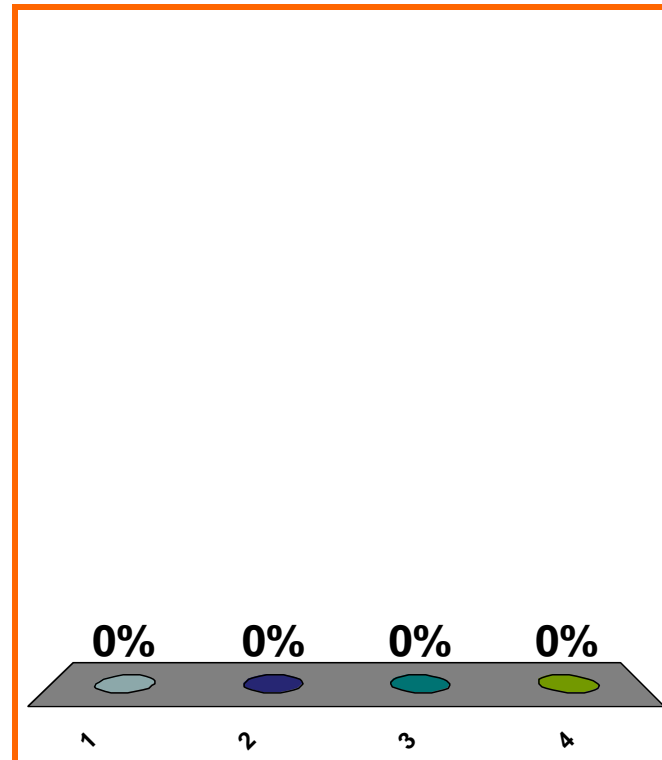
x^{10} is ??

(a) polynomial

(b) rational, **not** polynomial

(c) algebraic, **not** rational

(d) **none** of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

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Topic 0030

0 pts

16

10^x is ??

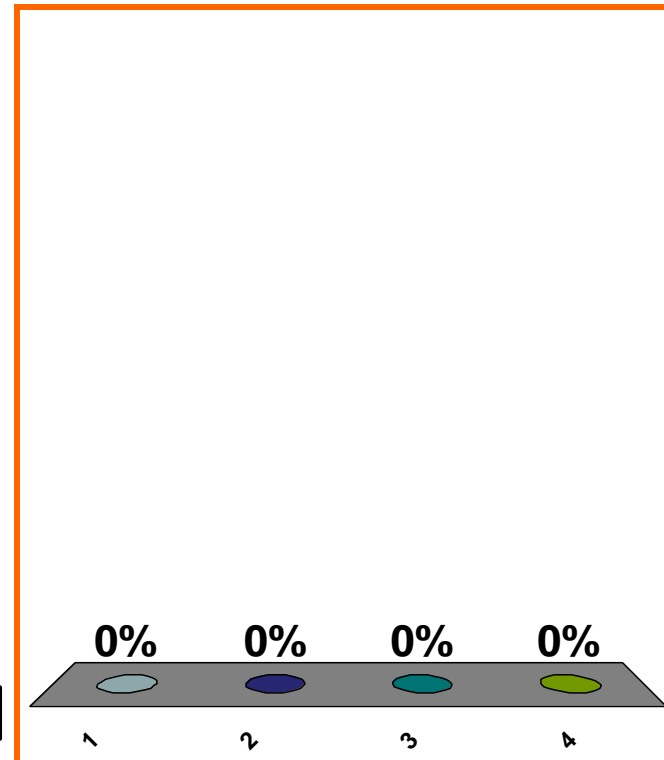
(a) polynomial

(b) rational, **not** polynomial

(c) algebraic, **not** rational

(d) **none** of the above

Correct answer: transcendental



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

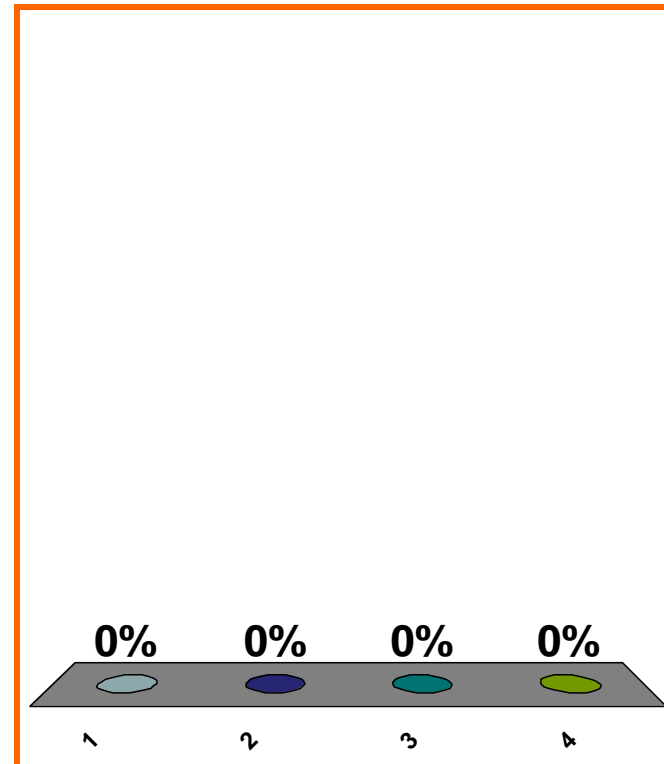
$$\frac{1}{x} \text{ is } ??$$

(a) polynomial

(b) rational, **not** polynomial

(c) algebraic, **not** rational

(d) **none** of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

distance from a to b ?

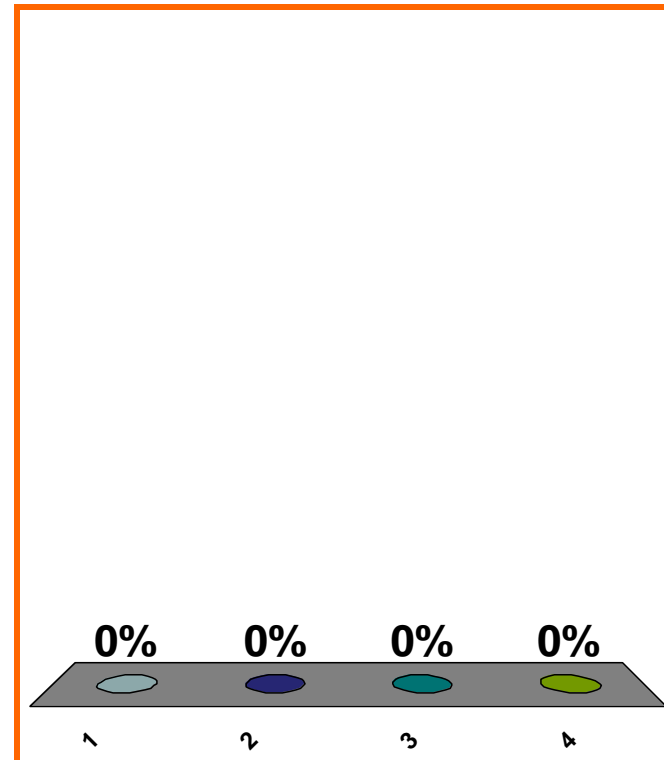
(a) $a - b$

(b) $b - a$

(c) $a + b$

(d) none of the above

Correct answer: $|a - b|$



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

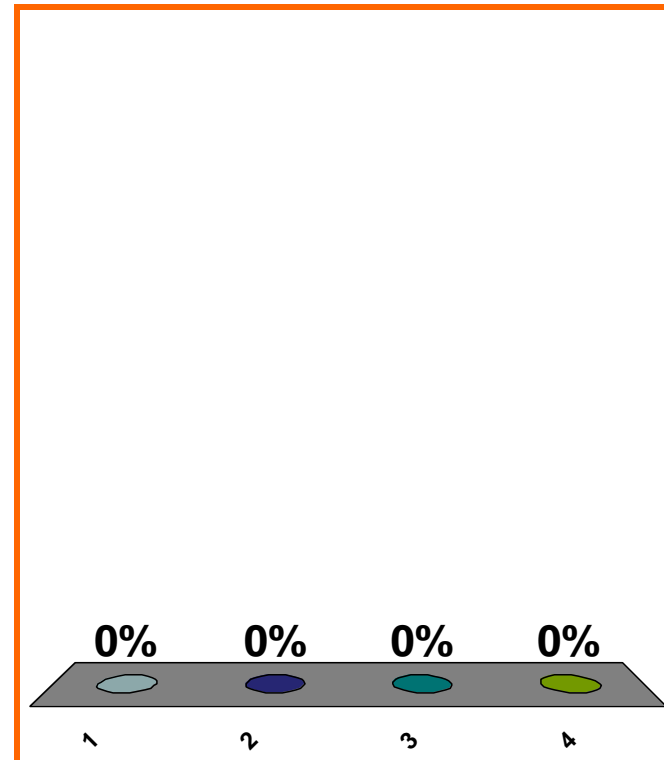
To get graph of $y + 1 = x^3$,
move graph of $y = x^3$...

(a) right 1

(b) left 1

(c) down 1

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

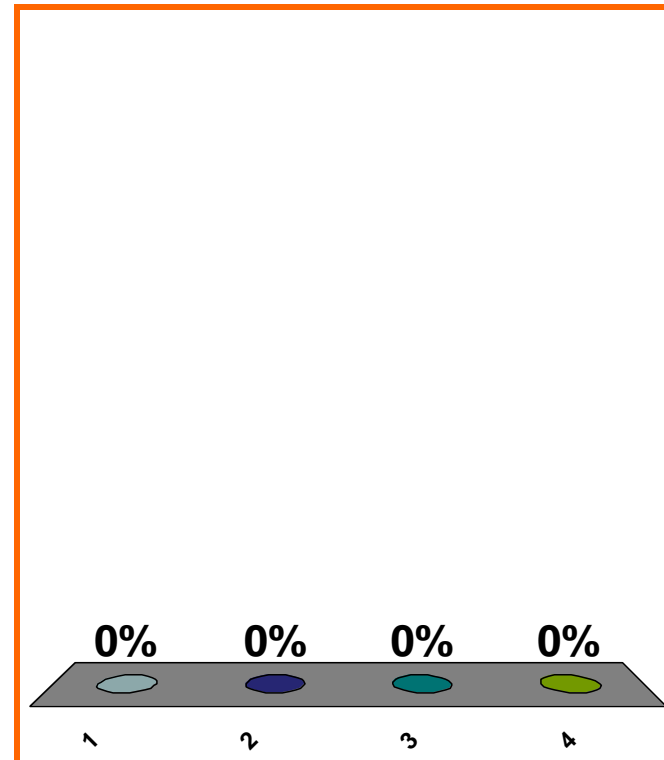
To get graph of $y^2 = \sin(x + \pi)$,
move graph of $y^2 = \sin(x)$...

(a) right π

(b) left π

(c) down π

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

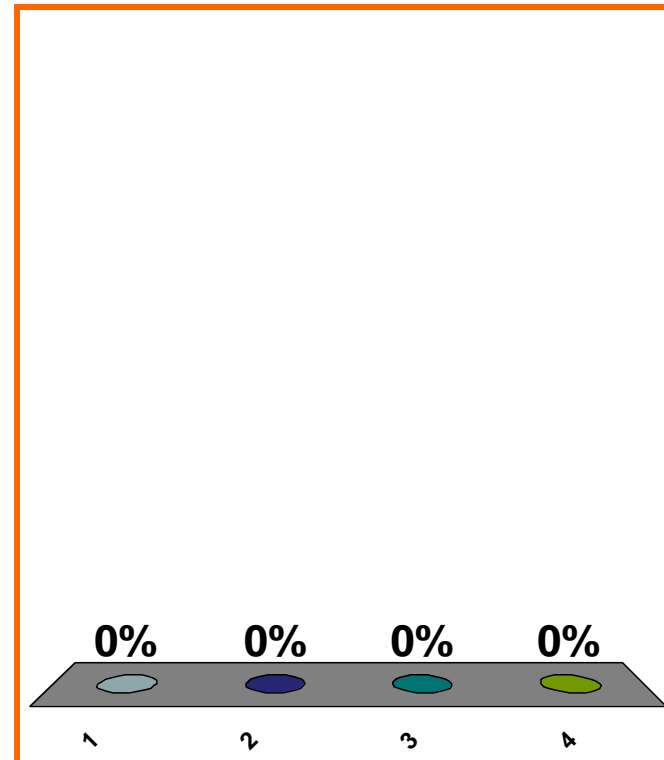
To get graph of $y^2 = \sin(x - \pi)$,
move graph of $y^2 = \sin(x)$...

(a) right π

(b) left π

(c) down π

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

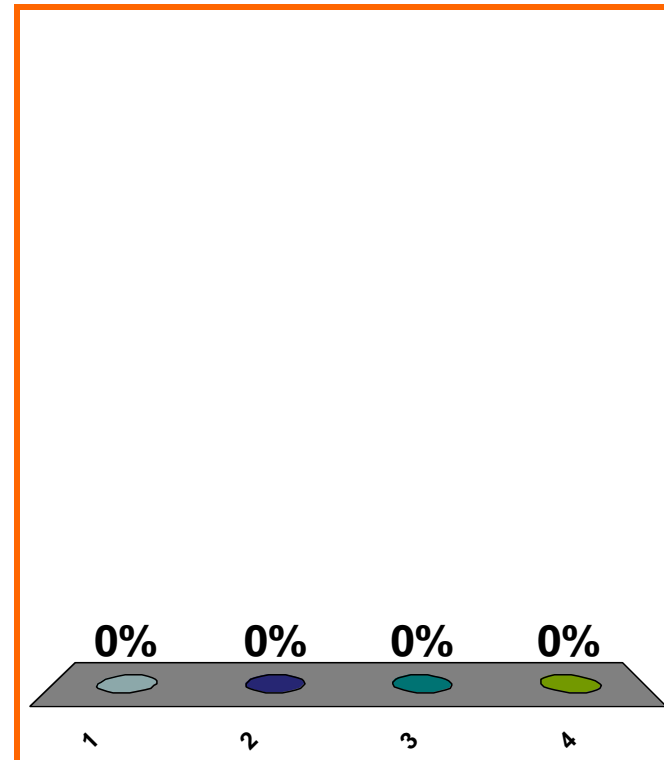
To get graph of $(y + \pi)^2 = \sin(x)$,
move graph of $y^2 = \sin(x)$. . .

(a) right π

(b) left π

(c) down π

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

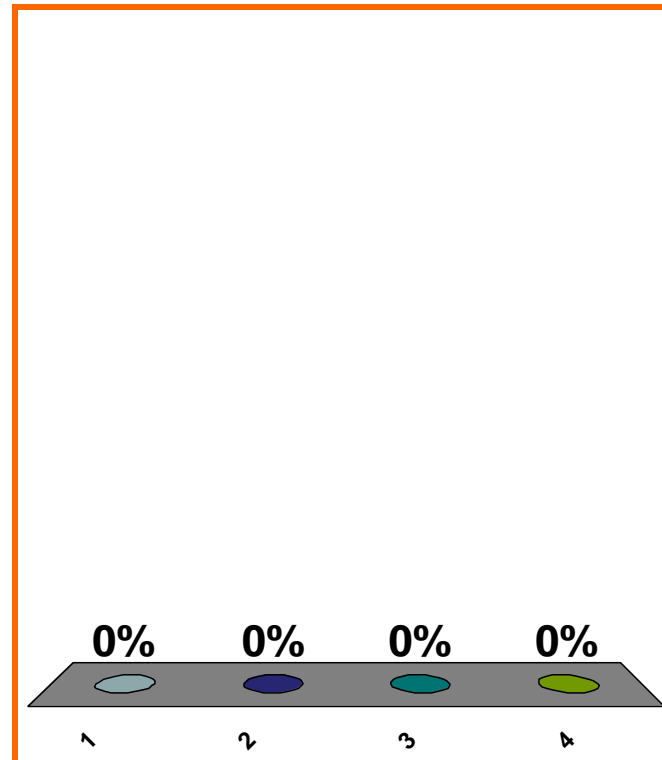
$$\sum_{j=2}^4 j^3 = ??$$

(a) $(2 + 3 + 4)^3$

(b) $(1 + 2 + 3 + 4)^3$

(c) $2^3 + 3^3 + 4^3$

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

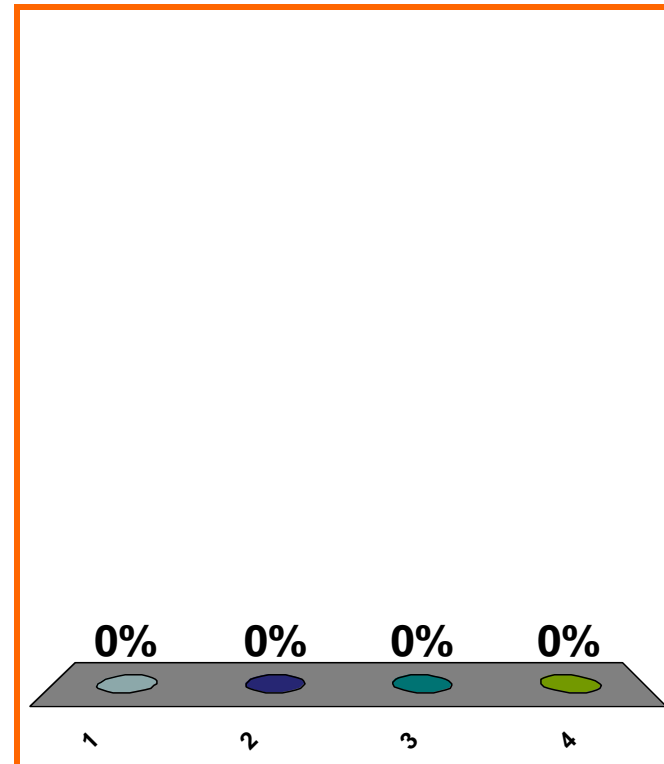
$$\sin(\pi/3) = ??$$

(a) $\sqrt{2}/2$

(b) $\sqrt{3}/2$

(c) $1/2$

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

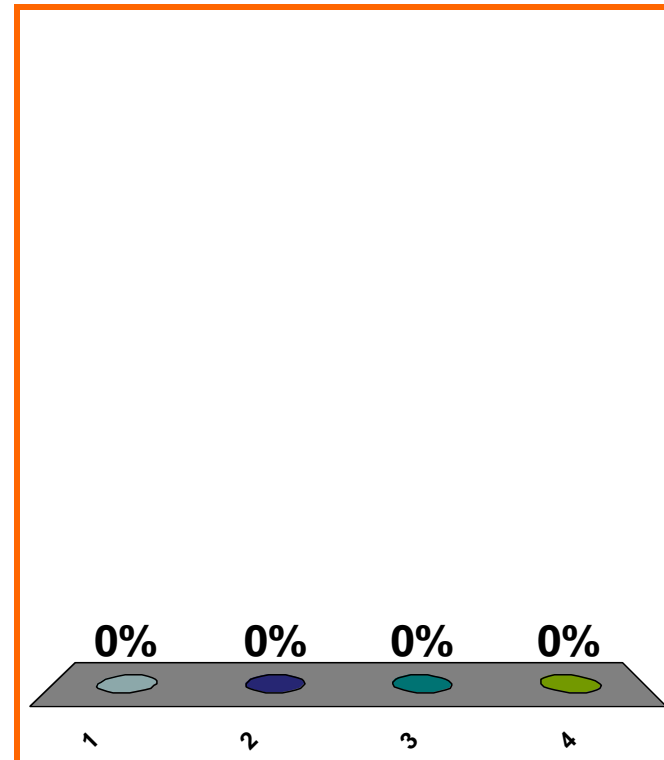
$$\arcsin(\sqrt{3}/2) = ??$$

(a) $\pi/3$

(b) $\pi/4$

(c) $\pi/6$

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

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Topic 0110

0 pts

26

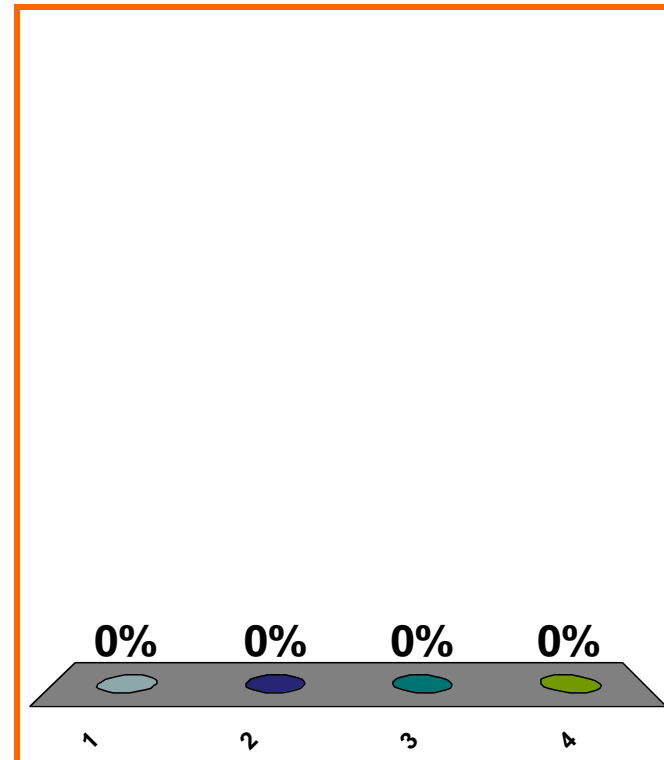
$$\sin(3\pi/4) = ??$$

(a) $\sqrt{2}/2$

(b) $-\sqrt{2}/2$

(c) $1/2$

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

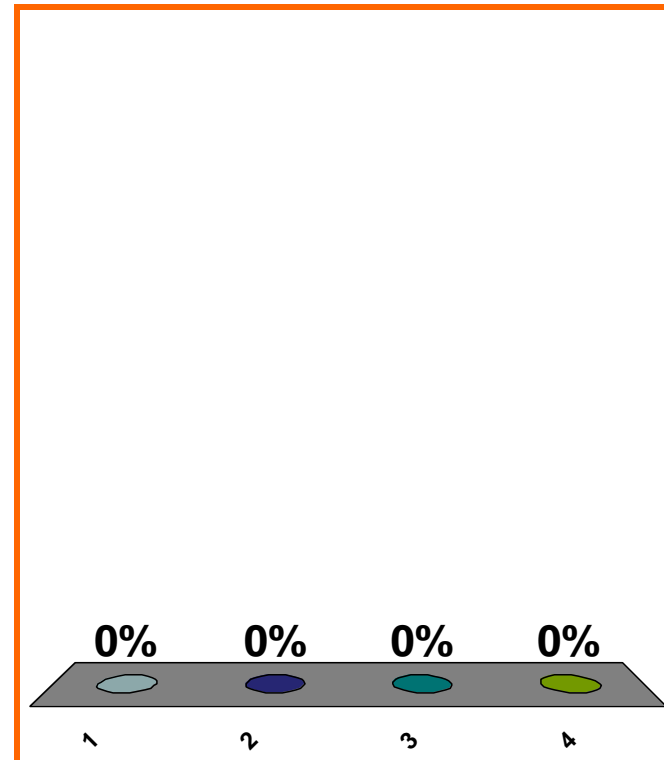
$$\arcsin(\sqrt{2}/2) = ??$$

(a) $\pi/3$

(b) $\pi/4$

(c) $\pi/6$

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

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Topic 0110

0 pts

28

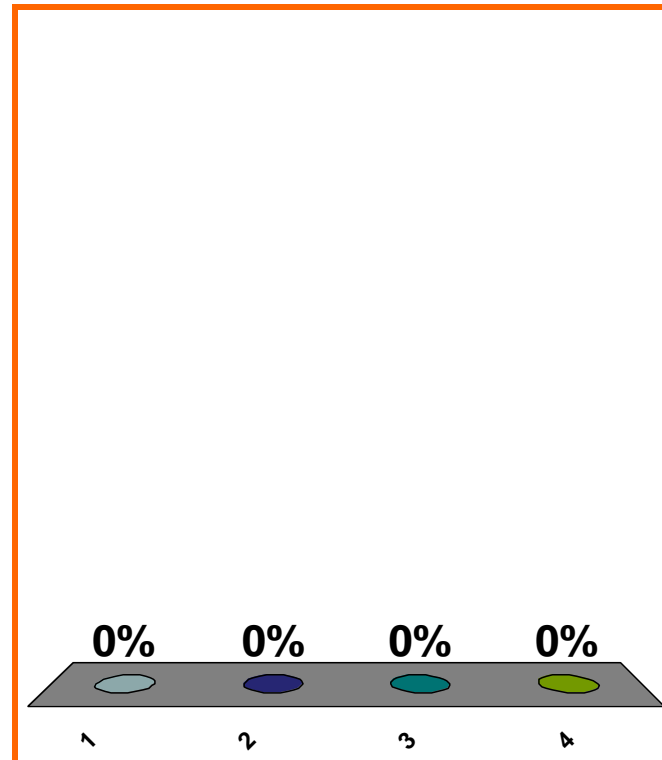
position = t^2
velocity = ??

(a) $2t$

(b) $t/2$

(c) t^2

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

from position 5 to position 9
from time 3 to time 11

average velocity = ??

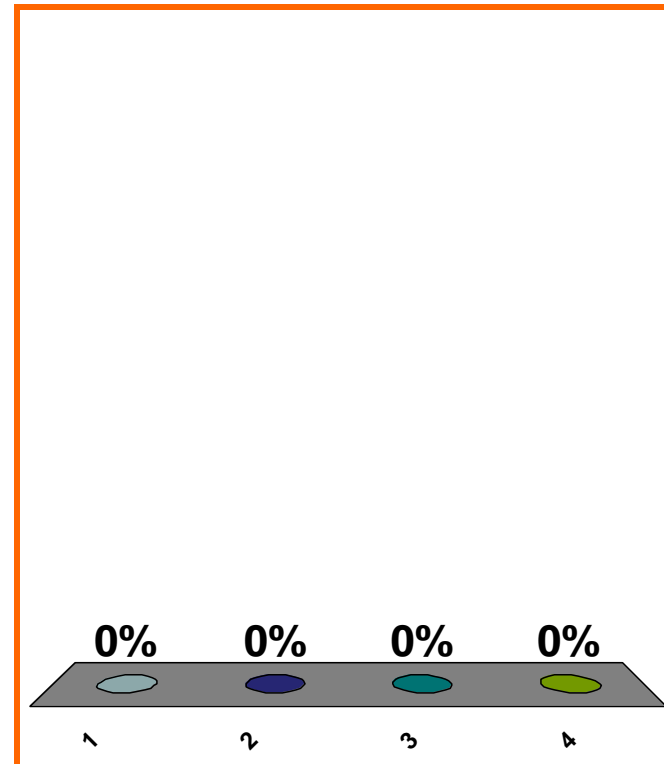
(a) 2

(b) 4

(c) 8

(d) none of the above

Correct answer: 1/2



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

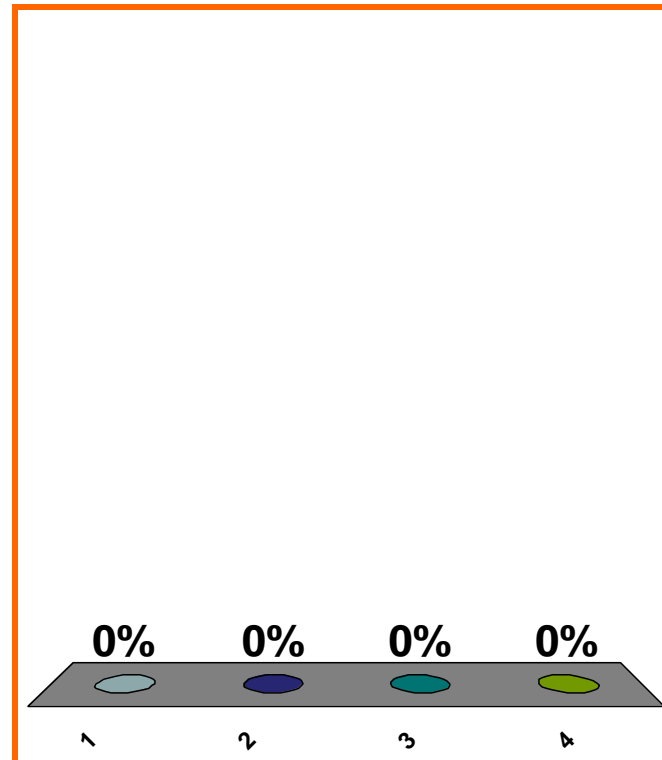
$$\lim_{x \rightarrow 0} \frac{2x^3 + 7x}{x} = ??$$

(a) 7

(b) 2

(c) 0

(d) none of the above

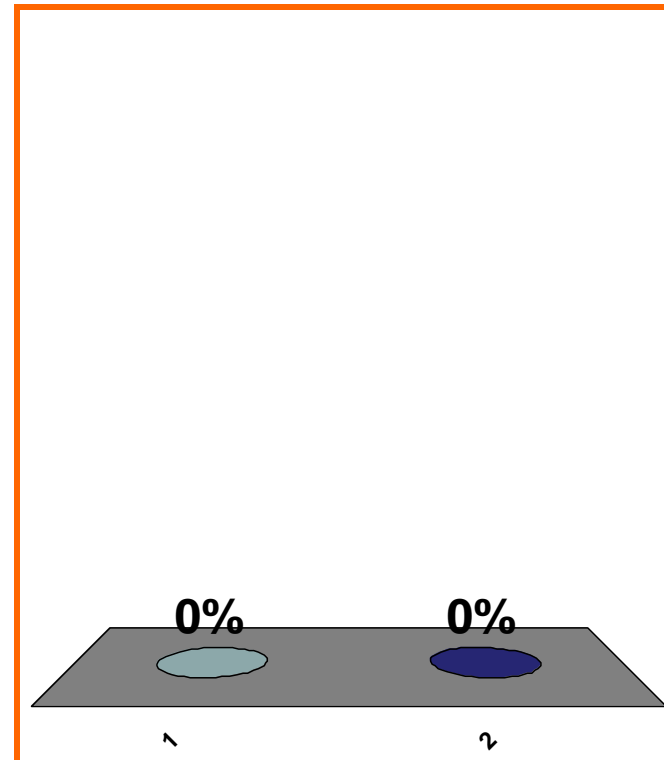


1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

$$\forall x \in \mathbb{R}, \quad \frac{3x^3 + 2x}{x} = 3x^2 + 2$$

(a) True

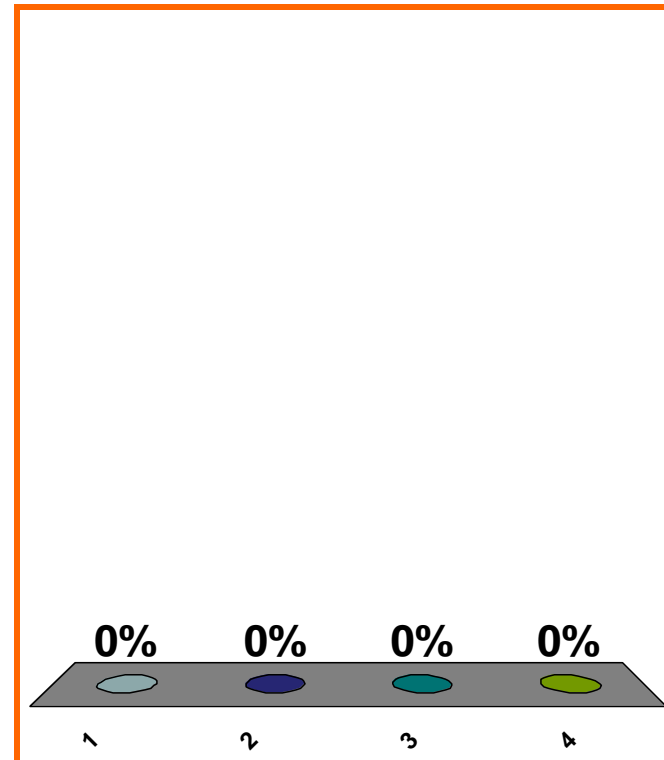
(b) False



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

$$\frac{3x^3 + 2x}{x} \text{ is } \dots$$

- (a) a polynomial in x
- (b) rational in x
- (c) transcendental in x
- (d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

$$\left[\frac{3x^3 + 2x}{x} \right]_{x \rightarrow 0} = ??$$

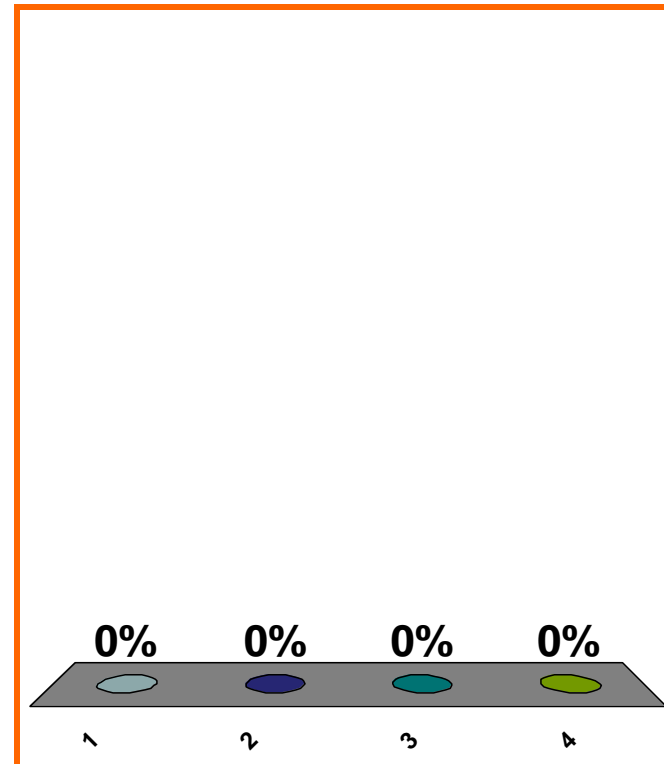
(a) 0

(b) 2

(c) 3

(d) none of the above

Correct answer: DNE



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

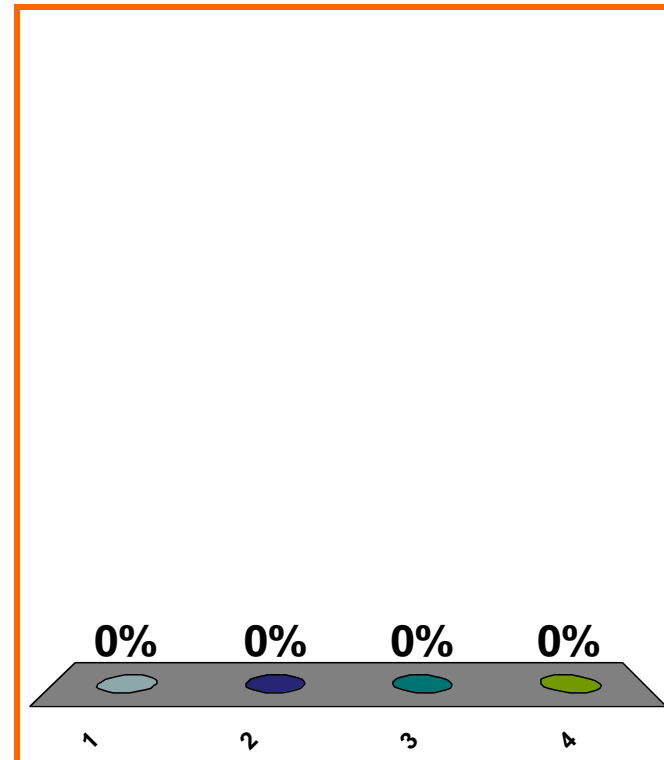
$$\lim_{x \rightarrow 0} \frac{3x^3 + 2x}{x} = ??$$

(a) 0

(b) 2

(c) 3

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

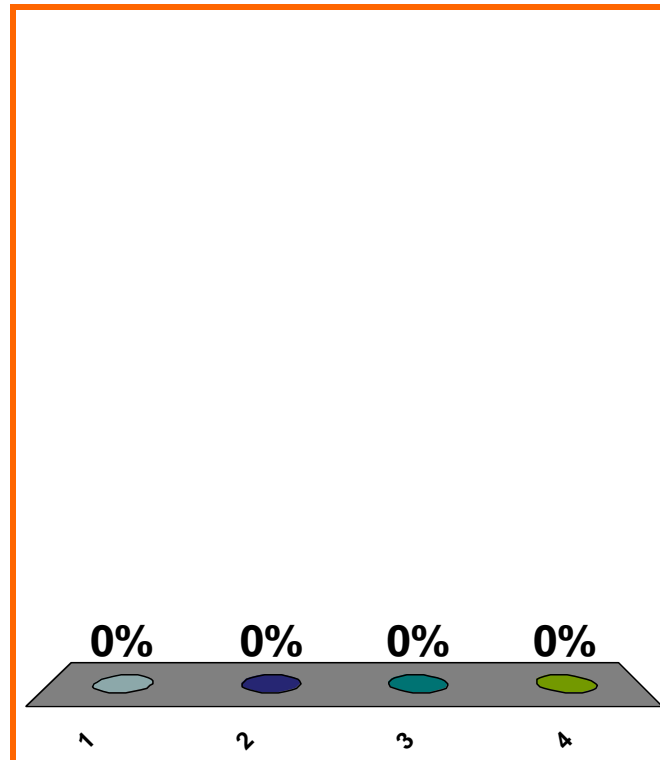
$$\frac{d}{dx} [(x^2)(\sin x)] = ??$$

(a) $(2x)(\cos x)$

(b) $(2x)(-\cos x)$

(c) $(2x)(\sin x) + (x^2)(\cos x)$

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

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LOOK AHEAD
Topic 0340

0 pts

36

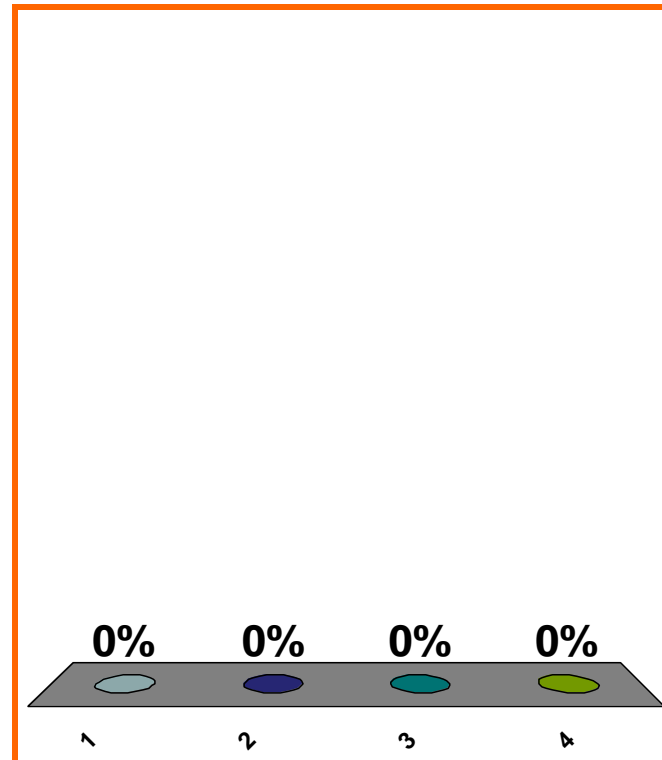
$$\frac{d}{dx} \left[\frac{\sin x}{x} \right] = ??$$

(a) $\frac{(\sin x)(1) - (x)(\cos x)}{x}$

(b) $\frac{(\sin x)(1) - (x)(\cos x)}{x^2}$

(c) $\frac{(x)(\cos x) - (\sin x)(1)}{x^2}$

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

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LOOK AHEAD
Topic 0350

0 pts

37

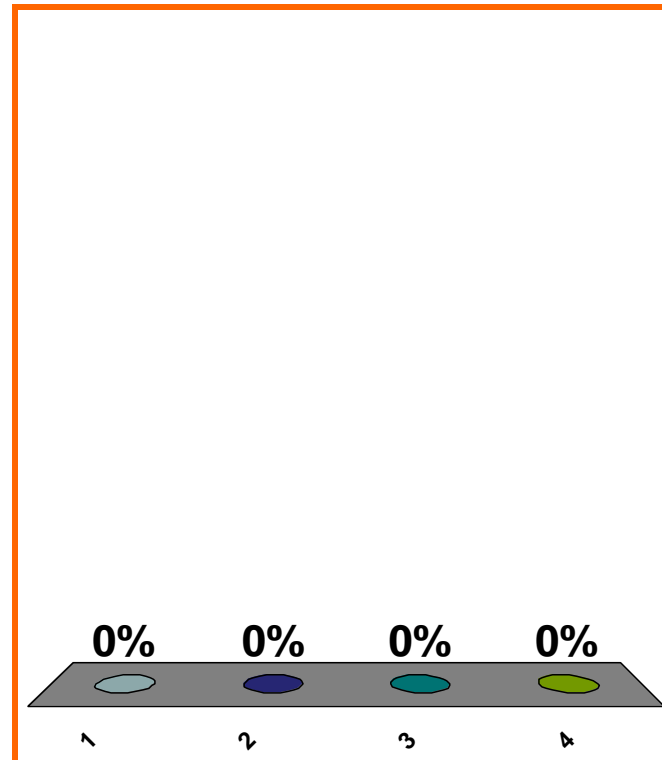
$$\lim_{x \rightarrow 5} (3x^3 - 2x + 8)$$

(a) $(3)(5^3) - (2)(5) + 8$

(b) $-\infty$

(c) ∞

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

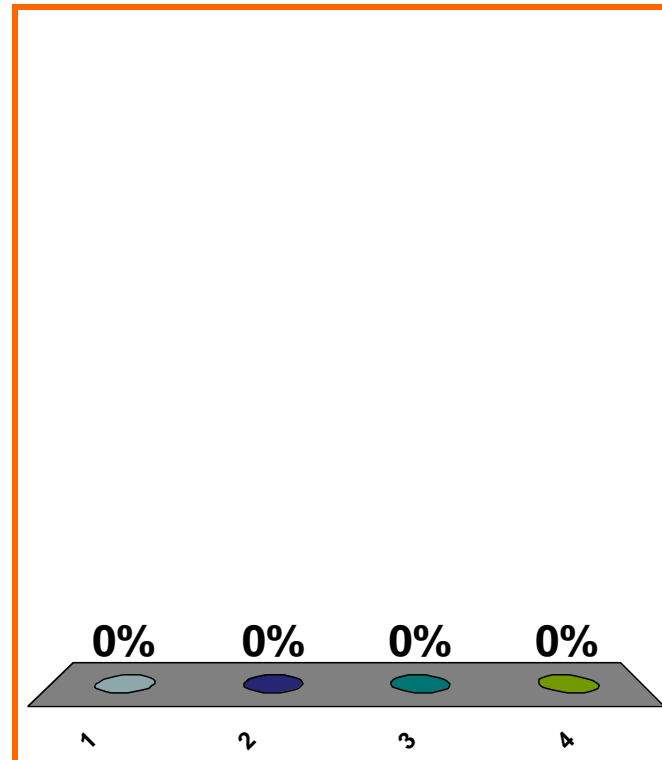
$$\lim_{x \rightarrow 5} \left(\frac{3x^3 - 2x + 8}{x - 4} \right)$$

(a) $(3)(5^3) - (2)(5) + 8$

(b) $-\infty$

(c) ∞

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

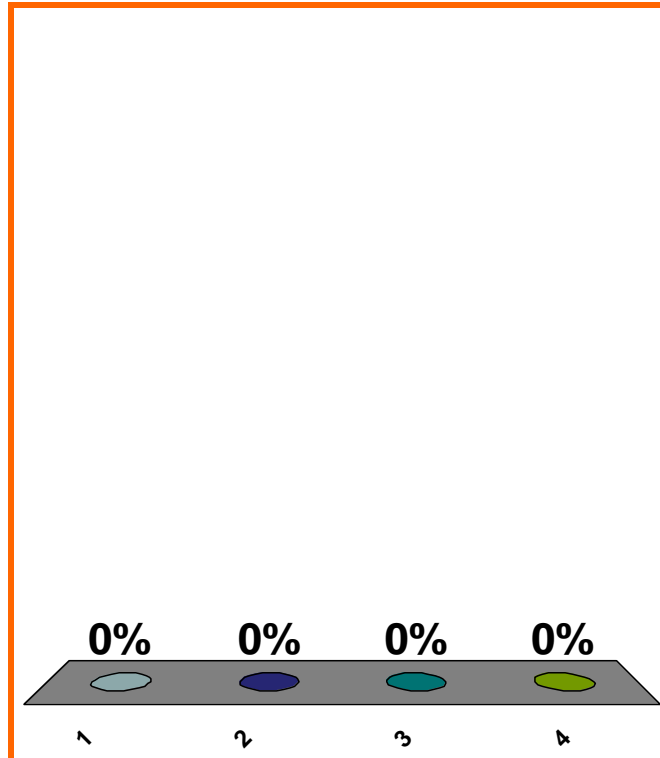
$$\lim_{x \rightarrow 5^+} \left(\frac{3x^3 - 2x + 8}{x - 5} \right)$$

(a) $(3)(5^3) - (2)(5) + 8$

(b) $-\infty$

(c) ∞

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

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LOOK AHEAD
Topic 0250

0 pts

40

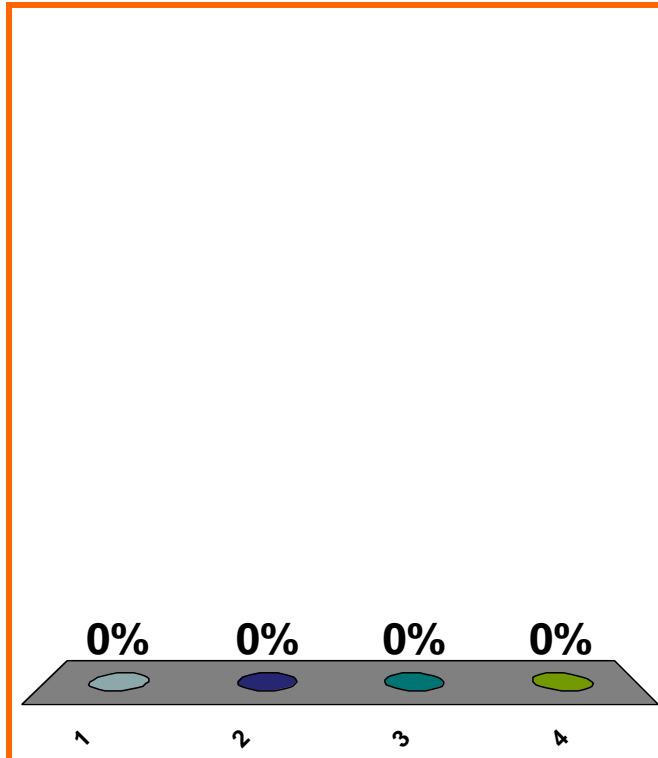
$$\lim_{x \rightarrow 5^-} \left(\frac{3x^3 - 2x + 8}{x - 5} \right)$$

(a) $(3)(5^3) - (2)(5) + 8$

(b) $-\infty$

(c) ∞

(d) none of the above



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

0 of 5

LOOK AHEAD
Topic 0250

0 pts

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$$\lim_{x \rightarrow 5} \left(\frac{3x^3 - 2x + 8}{x - 5} \right)$$

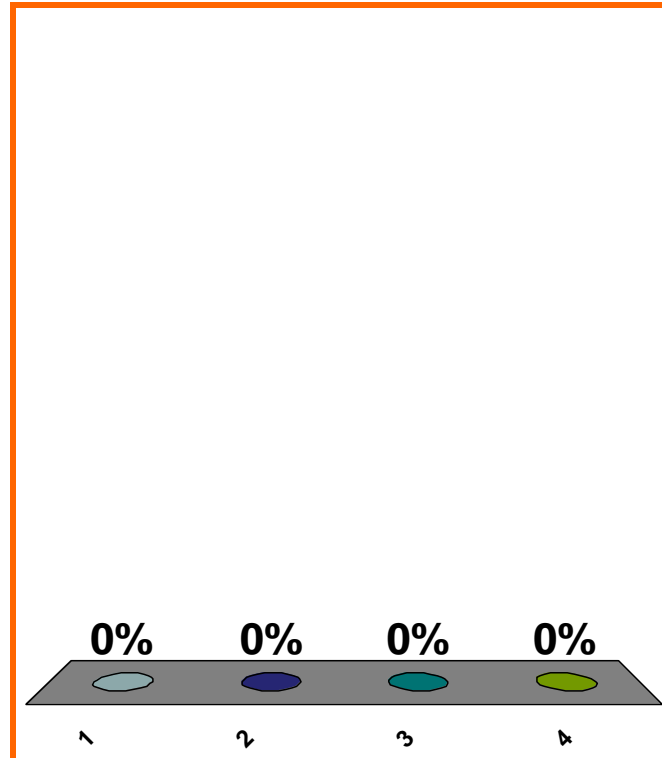
(a) $(3)(5^3) - (2)(5) + 8$

(b) $-\infty$

(c) ∞

(d) none of the above

Correct answer: DNE



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

0170-1. Use the graph of f given below to find the value of each quantity, if it exists.

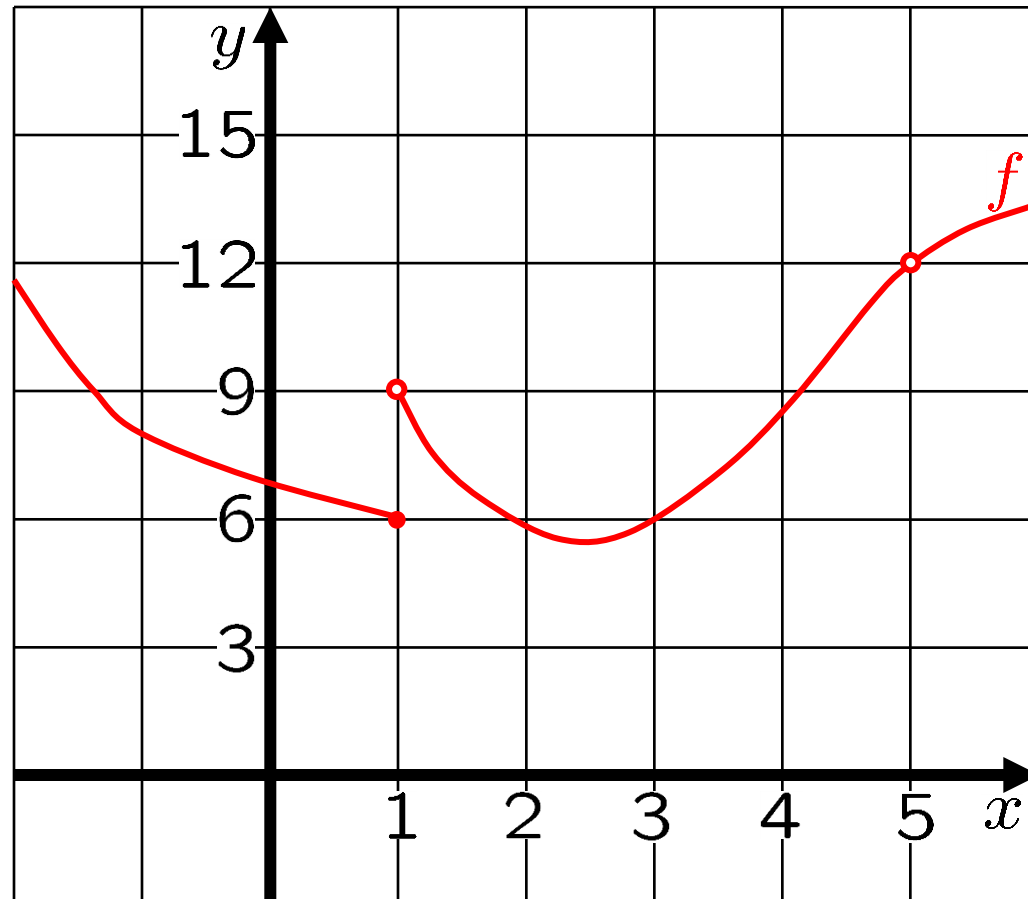
(a) $\lim_{x \rightarrow 1^-} f(x)$

(b) $\lim_{x \rightarrow 1^+} f(x)$

(c) $\lim_{x \rightarrow 1} f(x)$

(d) $\lim_{x \rightarrow 5} f(x)$

(e) $f(5)$



0170-2. Use the graph of f given below to find the value of each quantity, if it exists.

(a) $\lim_{x \rightarrow 1^-} f(x)$

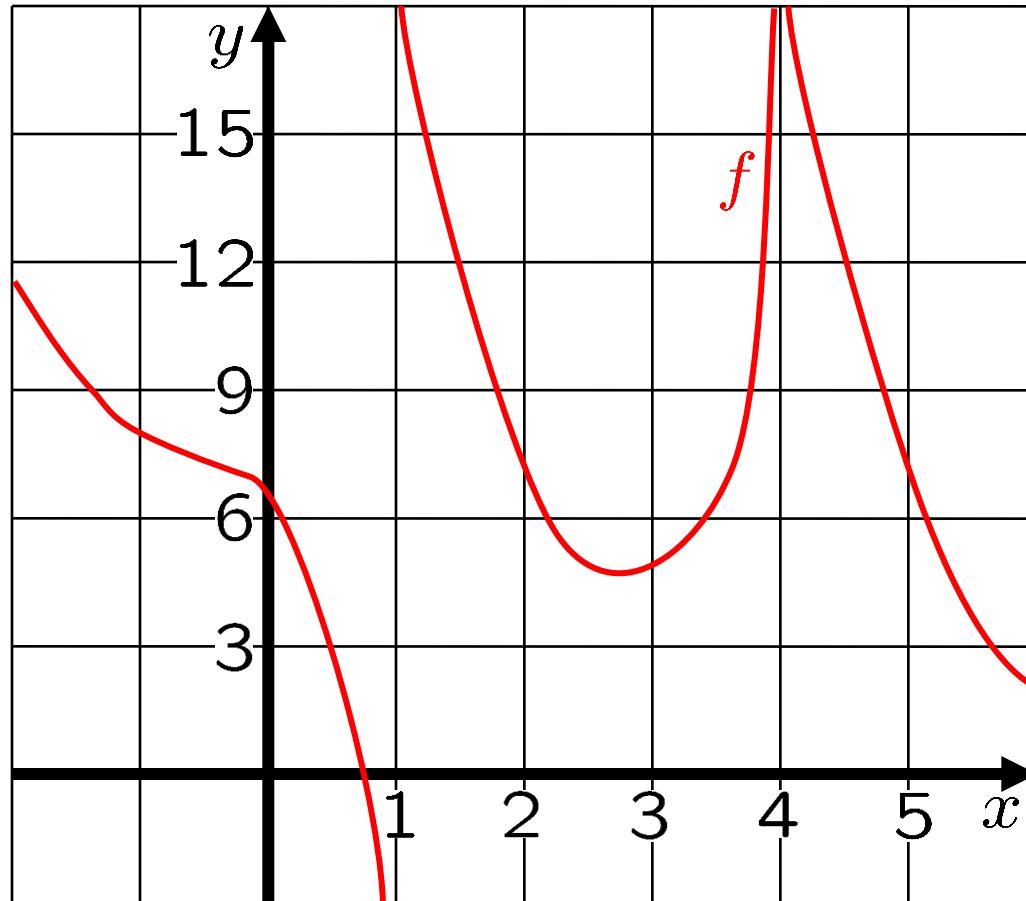
(b) $\lim_{x \rightarrow 1^+} f(x)$

(c) $\lim_{x \rightarrow 1} f(x)$

(d) $\lim_{x \rightarrow 4^-} f(x)$

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

(f) $\lim_{x \rightarrow 4} f(x)$



0170-3. Show a graph of a function h s.t.

OLD

$$\lim_{x \rightarrow 2^-} h(x) = 7, \quad \lim_{x \rightarrow 2^+} h(x) = 6, \quad h(2) = 5,$$

$$\lim_{x \rightarrow 3} h(x) = -\infty,$$

$$\lim_{x \rightarrow 4^-} h(x) = \infty, \quad \lim_{x \rightarrow 4^+} h(x) = -\infty,$$

$$\lim_{x \rightarrow -\infty} h(x) = -3 \quad \text{and} \quad \lim_{x \rightarrow \infty} h(x) = 1.$$

0170-5. a. Compute $\lim_{x \rightarrow 1^-} \frac{2x + 3}{x - 1}$,

or explain why the limit
does not exist.

b. Compute $\lim_{x \rightarrow 1^+} \frac{2x + 3}{x - 1}$,

or explain why the limit
does not exist.

c. Compute $\lim_{x \rightarrow 1} \frac{2x + 3}{x - 1}$,

or explain why the limit
does not exist.

tangent slopes for $y = x^3$, esp. at $x = 5$.

$$\lim_{h \rightarrow 0} \frac{(5 + h)^3 - 5^3}{h}$$

$$\lim_{\Delta x \rightarrow 0} \frac{(5 + \Delta x)^3 - 5^3}{\Delta x}$$

$$\lim_{h \rightarrow 0} \frac{|h|}{h}$$

the limit game

LOOK AHEAD

differentiate polynomials

differentiate all 6 trig functions

product rule, quotient rule

SAVE THE
SESSION
DATA

RETURN TO
PRESENTATION