Sudoku Puzzle – Precalculus Topics for A.P. Calculus
A Puzzle by David Pleacher

Solve the 35 multiple-choice problems below.
The choices are integers from 1 to 9 inclusive.
Place the answer in the corresponding cell (labeled A, B, C, … Y, Z, a, b,…h, i).
Then solve the resulting SUDOKU puzzle.

The rules of Sudoku are simple.
Enter digits from 1 to 9 into the blank spaces.
Every row must contain one of each digit.
So must every column, and so must every 3x3 square.
Each Sudoku has a unique solution that can be reached logically without guessing.

_____ A. If $\cos\theta = -\frac{3}{5}$ and $\tan\theta = -\frac{4}{3}$ then $\sin\theta =$

(1) $\frac{3}{4}$ (2) $-\frac{3}{4}$ (3) $\frac{4}{5}$ (4) $-\frac{4}{5}$

_____ B. Which of the following is correct?

(1) $\tan^2 x = \sec^2 x + 1$ (2) $\sin^2 x = \cos^2 x - 1$

(3) $\tan^2 x = \csc^2 x + 1$ (4) $\tan^2 x = \sec^2 x - 1$

_____ C. The inverse function of $y = 3x + 12$ is

(1) $y = \frac{x - 12}{3}$ (2) $y = \frac{x + 12}{3}$

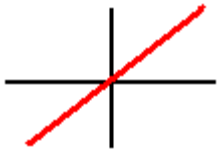
(3) $y = 3x - 12$ (4) $y = -3x - 12$

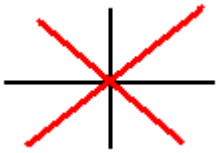
_____ D. The inverse secant of -2 is

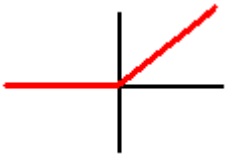
(6) -60° (7) 30° (8) 60° (9) 120°

_____ E. The graph of $y = \dfrac{x + |x|}{2}$ is

(5) 

(6) 

(7) 

(8) 

_____ F. Which is the Double Angle Property for cosines?

(4) $\cos\left(\dfrac{x}{2}\right) = \sqrt{\dfrac{1+\cos x}{2}}$ (5) $\cos(2x) = \cos^2 x - \sin^2 x$

(6) $\cos(2x) = 1 + 2\sin^2 x$ (7) $\sin(2x) = 2\sin x \cos x$

_____ G. Which of the following statements is true?

(1) $\log\left(\dfrac{A}{B}\right) = \log(A) - \log(B)$

(2) $\log\left(\dfrac{A}{B}\right) = \dfrac{\log A}{\log B}$

(3) $\log(A - B) = \log(A) - \log(B)$

(4) $\log(A - B) = \log\left(\dfrac{A}{B}\right)$

_____ H. The exact value of $\tan\left(Arc\sin\left(-\dfrac{2}{3}\right)\right)$ is

(4) $\dfrac{-1}{3}$ (5) $-.89442$ (6) $\dfrac{-\sqrt{5}}{3}$ (7) $\dfrac{-2\sqrt{5}}{5}$

_____ I. The range of $y = \sin^{-1} x$ is

(4) $0° \le x \le 180°$ (5) $-45° \le x \le 45°$

(6) $-90° \le x \le 90°$ (7) $90° \le x \le 270°$

_____ J. If a, b, and c represent the sides of a triangle,

and h is the altitude to side b, and $s = \frac{1}{2}(a+b+c)$,

which of the following does not find the area of the triangle?

(6) $\frac{1}{2}bc\sin A$ (7) $\sqrt{a^2+b^2}$

(8) $\sqrt{s(s-a)(s-b)(s-c)}$ (9) $\frac{1}{2}bh$

_____ K. If $f(x) = 3x+1$ and $g(x) = \sqrt{x}$, determine $g(f(5))$

(1) $3\sqrt{5}+1$ (2) 4 (3) 16 (4) $\sqrt{5}$

_____ L. If the graph of $y = 2^{-x} - 1$ is reflected in the x-axis, then an equation of the reflection is:

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

(4) $y = \log_2(x+1)$ (5) $y = \log_2(1-x)$

_____ M. What is the domain of the function f given by $f(x) = \frac{\sqrt{x^2-4}}{x-3}$

(3) $\{x : x \ne 3\}$ (4) $\{x : |x| \le 2\}$ (5) $\{x : |x| \ge 2\}$

(6) $\{x : |x| \ge 2 \text{ and } x \ne 3\}$ (7) $\{x : x \ge 2 \text{ and } x \ne 3\}$

_____ N. $4\cos\left(x + \frac{\pi}{3}\right) =$

(4) $2\sqrt{3}\cos x - 2\sin x$ (5) $2\cos x - 2\sqrt{3}\sin x$

(6) $2\cos x + 2\sqrt{3}\sin x$ (7) $2\sqrt{3}\cos x + 2\sin x$

(8) $4\cos x + 2$

_____ O. Transform the following parametric equations to a Cartesian equation by eliminating the parameter.

$x = 5\ \cos(t)$

$y = 5\ \sin(t)$

(1) $x + y = 5\left(\cos(t) + \sin(t)\right)$ (2) $y = 5x$

(3) $x^2 + y^2 = 25$ (4) $y = 5\sin\left(5\cos x\right)$

_____ P. Determine the constant k if $x - 3$ is a linear factor of $3x^3 - 9x^2 + kx - 12$.

(1) k = 3 (2) k = 4 (3) k = 5 (4) k = 6

_____ Q. Find the equation of all lines parallel to 5x – 3y + 4 = 0.

(6) 5x + 3y + k = 0 (7) 3x – 5y + k = 0

(8) 5x – 3y + k = 0 (9) 3x + 5y + k = 0

_____ R. Find the real number k for which the solution set of $|kx + 2| < 6$ is the open interval $-1 < x < 2$.

(1) $k = -2$ (2) $k = 2$ (3) $k = 4$ (4) $k = -4$

_____ S. Determine the solution of $|x^2 - 16| = 9x + 6$

(6) $x = \{-2\}$ (7) $x = \{-2, 11\}$ (8) $x = \{1, -10\}$ (9) $x = \{1, 11\}$

_____ T. If $f(x) = \dfrac{x-1}{x}$ and $g(x) = 1 - x$ then $f(g(x)) =$

(6) $\dfrac{x}{1-x}$ (7) $\dfrac{x}{x-1}$ (8) $\dfrac{1}{x}$ (9) $\dfrac{x-1}{x}$

_____ U. Determine the angle of inclination of the line 2x + y = 2009. (Use a calculator)

(1) 116.6˚ (2) 153.4˚ (3) -26.6˚ (4) 63.4˚ (5) -63.4˚

_____ V. Given f(x) = cos (ArcTan (x)).
What is the range of f(x)?

(1) $-\frac{\pi}{2} < y < \frac{\pi}{2}$ (2) -1 < y < 1 (3) $-1 \le y \le 1$
(4) $0 \le y < 1$ (5) $0 < y \le 1$

_____ W. The inverse function of y = 2x – 5 is

(3) y = -2x + 5 (4) $y = \frac{1}{2x - 5}$

(5) $y = \frac{x+5}{2}$ (6) $y = \frac{x-5}{2}$

_____ X. Solve $|2x-1| < 5$ for x.
(1) -3 < x < 2 (2) -4 < x < 6 (3) -3 < x < -2 (4) -2 < x < 3

_____ Y. Transform the parametric equations to a Cartesian equation by eliminating the parameter.
x = 3 – 6t
y = 1 + 12t

(1) $y = 1 + 12\left(\frac{x-3}{6}\right)$ (2) $y = 2x - 5$
(3) $2x + y = 7$ (4) $y = 2x + 7$

_____ Z. Which of the following equations has a graph that is symmetric with respect to the origin?

(5) $y = \frac{x-1}{x}$ (6) $y = 2x^4 + 1$ (7) $y = x^3 + 2$
(8) $y = \frac{x}{x^3+1}$ (9) $y = x^3 + 2x$

_____ a. Solve $|2x+1|>4$

(1) $\frac{-5}{2}<x<\frac{3}{2}$ (2) $x<\frac{-5}{2}$ or $x>\frac{3}{2}$

(3) $\frac{-1}{2}<x<\frac{3}{2}$ (4) $x<\frac{-5}{2}$ or $x>\frac{-1}{2}$

_____ b. Which of the following equations has a graph that is symmetric with respect to the y-axis?

(5) $y=\frac{x-1}{x}$ (6) $y=x^3+2x$ (7) $y=2x^4+1$

(8) $y=x^3+2$ (9) $y=\frac{x}{x^3+1}$

_____ c. If $f(x)=\log_b x$, then $f(bx)=$

(4) b f(x) (5) (f(b)) (f(x)) (6) 1 + f(x)

(7) x f(b) (8) f(x)

_____ d. Which of the following equations has a graph that is symmetric with respect to the line $y=x$?

(5) $y=\frac{2x-1}{x}$ (6) $y=3x^3+2x$ (7) $y=x^4$

(8) $xy=2$ (9) $y=\frac{x}{x^3+1}$

_____ e. The range of $y=\cos^{-1}x$ is

(1) $0^\circ \le x < 90^\circ$ (2) $-90^\circ \le x \le 90^\circ$

(3) $0^\circ < x < 180^\circ$ (4) $0^\circ \le x \le 180^\circ$

_____ f. The domain of $y=\frac{\sqrt{x-1}}{x^2-2x}$ is

(1) $x \ge 1,\ x \ne 2$ (2) $x \ne 0,\ x \ne 2$

(3) $x \ge 1$ (4) $0 \le x < 2$

_____ g. Convert 75° to radians.

(1) $\frac{\pi}{12}$ (2) $\frac{2\pi}{5}$ (3) $\frac{3\pi}{5}$ (4) $\frac{5\pi}{12}$

_____ h. Convert $\frac{2\pi}{9}$ to radians.

(1) 29° (2) 33° (3) 40° (4) 50°

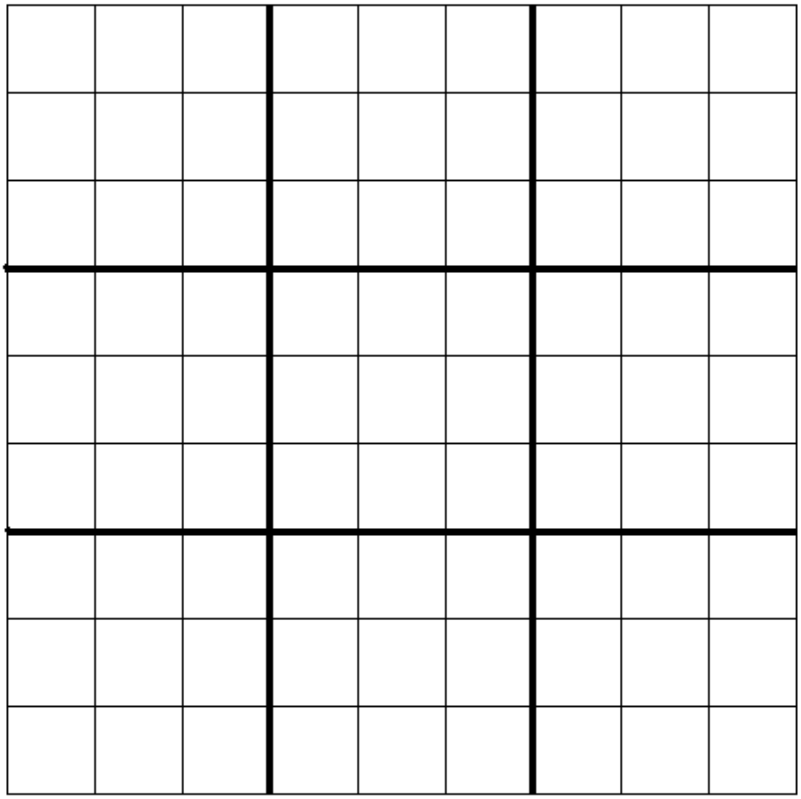
_____ i. The graph of the equation $x = |y|$ exhibits which of the following symmetries?

(5) y-axis (6) Origin (7) $y = x$ (8) x-axis

(9) No symmetry

		A		B			C	
	D	E	F		G			H
I					J		K	L
	M	N	O		P	Q		R
S			T			U		V
					W			
X					Y		Z	a
	b	c	d			e		
			f		g	h	i	

Here is a blank SUDOKU board for you to use:



Solution to the Sudoku With Precalculus Topics

A = 3
B = 4
C = 1
D = 9

E = 8
F = 5
G = 1
H = 7

I = 6
J = 7
K = 2
L = 3

M = 6
N = 5
O = 3
P = 2

Q = 8
R = 4
S = 9
T = 7

U = 1
V = 5
W = 5
X = 4

Y = 3
Z = 9
a = 2
b =7

c = 6
d = 8
e = 4
f = 1

g = 4
h = 3
i = 8

7	5	3	2	4	6	9	1	8
2	9	8	5	3	1	6	4	7
6	1	4	9	8	7	5	2	3
1	6	5	3	9	2	8	7	4
9	4	2	7	6	8	1	3	5
8	3	7	4	1	5	2	6	9
4	8	1	6	5	3	7	9	2
3	7	6	8	2	9	4	5	1
5	2	9	1	7	4	3	8	6