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PRACTICE QUESTION

Solve the following system over {Real Numbers}:

$$\frac{1}{x^2} + \frac{4}{xy} - \frac{3}{y^2} = 9$$

$$\frac{1}{x} + \frac{1}{y} = 3$$

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QUESTION # 2

Solve for all ordered triples (a, b, c) such that $a > b > c$:

$$(\log_2 a)(\log_3 b)(\log_5 c) = -30$$

$$(\log_2 a)(\log_3 b) + (\log_2 a)(\log_5 c) + (\log_3 b)(\log_5 c) = -1$$

$$(\log_2 a) + (\log_3 b) + (\log_5 c) = 6$$

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QUESTION #1

The formula for the motion of a particle along a straight line is $s = t^3 - 9t^2 + 24t - 18$. Find the average speed for the interval t = 0 to t = 2.

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QUESTION # 3

Evaluate: $\frac{d}{dx} \int_{x^3}^{\frac{\pi}{2}} \sin^3 t \, dt$

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QUESTION #4

Determine the coefficient of $\left(x-\frac{\pi}{2}\right)^6$ in the Taylor's series expansion about $\frac{\pi}{2}$ of $f(x) = \sin x$.

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QUESTION # 6

A ball 30 cm in diameter is floating so that the top of the ball is 6 cm above the smooth surface of a pond. Find the circumference, in centimeters, of the circle formed by the contact of the water surface with the ball.

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QUESTION #5

Two lines lie in the x-y plane. The first line has an x-intercept of 12 and a y-intercept of 12. The second line has a y-intercept of 18 and a x-intercept of p where p is a rational number. The two given lines and the line $x = 3$ meet in a single point. What is the value of 6p?

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QUESTION # 7

For the differential equation $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 25y = 0$, find the solution that has a graph passing through the point (0, 2) with slope 6.

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QUESTION # 8

The area of a pool of water under a leaking pipe is $(4t + t^2)$ square inches after t seconds. The increase in the area of the pool between $t = 5.01$ seconds and $t = 5.02$ seconds is approximately (to the nearest hundredth)?

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QUESTION # 10

A rhombus has half the area of a square with the same side length. Find the ratio of the longer diagonal of the rhombus to the shorter diagonal of the rhombus.

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QUESTION # 9

Find all real numbers x, $0 \le x \le 2\pi$, such that

$\log(2 \sin x) + \log\left(\sqrt{3} + 2 \sin x\right) = \log 6$

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QUESTION # 11

If $y = \dfrac{(3x + 1)^8 (x + 2)^5}{\sqrt{x + 1}}$ for all $x > -\dfrac{1}{3}$ then find $\dfrac{dy}{dx}$

where $x = 0$.

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QUESTION # 12

If $\frac{x-2y}{3x-4y} = 5$, find the numerical value of $\frac{2x-y}{4x-3y}$.

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QUESTION # 13

Nine lines parallel to the base of a triangle divide the other sides into 10 equal segments and the area into 10 distinct parts. If the area of the largest of these parts is 38, find the area of the original triangle.

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