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Chapter 8 and 9 Test Review

1) Find the arc length of $x = \frac{y^3}{3} + \frac{1}{4y^2}$, $1 \le y \le 2$

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2) Find the arc length of $y = \ln(\cos x)\,, 0 \leq x \leq \frac{\pi}{3}$

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3) A manufacture of corrugated metal roofing wants to produce panels that are 28 inches wide and 2 inches high by processing flat sheets of metal as shown below. The profile of the roofing takes the shape of a sine wave modeled by the curve $y = \sin\left(\frac{\pi x}{7}\right)$. What is the width of the flat panels they need to order?

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4) Find the surface area by rotating $y^2 = x + 1, 3 \leq x \leq 15$ around the x-axis.

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5) Find the surface area by rotating $y = \ln(\cos x)$, $0 \leq x \leq \frac{\pi}{3}$ around the x-axis.

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6) Find the surface area by rotating $x^{\frac{2}{3}} + y^{\frac{2}{3}}, 0 \leq y \leq 1$ around the y-axis.

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7) Find the surface area of the ellipsoid formed by $\frac{x^2}{9} + \frac{y^2}{4} = 1$ rotated around the x-axis.

8) $xyy' = x^2 + 1$

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9) $\frac{dx}{dy} = \frac{2y+\sec^2 y}{2x}, x(0) = -5$

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10) The air in a room with a volume of 200 m^3 contains 0.5% carbon dioxide initially. Fresher air with only 0.05% carbon flows into the room at a rate of $4\frac{m^3}{min}$ and the mixed air flows out at the same rate. Find the percentage of carbon dioxide in the room as a function of time? What is the % of carbon dioxide in the room after 2 hours?