AP Calculus AB - Worksheet 60 **Volumes of Solids with Known Cross Sections**

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1. **(Calculator Permitted)** The region bounded by the *y*-axis and the graphs of $y = \dfrac{x^3}{1+x^2}$ and $y = 4 - 2x$ is the base of a solid. For this solid, each cross-section perpendicular to the *x*-axis is a square. Find the volume of this solid.

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2. **(Calculator Permitted)** The region in the first quadrant bounded by the graphs of $f(x) = 1 + \sin(2x)$ and $g(x) = e^{x/2}$ is the base of a solid. For this solid, the cross sections perpendicular to the *x*-axis are semicircles with diameters extending from $y = f(x)$ to $y = g(x)$. Find the volume of this solid.

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3. The base of a solid is bounded by $y = x^3, y = 0,$ and $x = 1$. Find the volume of the solid that has cross sections that are squares taken perpendicular to the **y-axis**. (Hint: This is a 'dy' problem)

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4. If $f(x) = x \ln x,$ then $f'''(e) =$ A $\dfrac{1}{e}$ B 0 C $-\dfrac{1}{e^2}$ D $\dfrac{1}{e^2}$ E $\dfrac{2}{e^3}$

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5. Set up, but do not evaluate, an expression involving one or more integrals that can be used to find the area bounded by the parabola $y = x^2$ and the lines $y = 1$ and $y = 9$.

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6. $\lim\limits_{x \to 3} \dfrac{x+3}{x^2 - 9} =$ A $+\infty$ B 0 C $\dfrac{1}{6}$ D $-\infty$ E Nonexistent

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7. If $F(x) = 4 + \int_0^x (3t^2 + 2t + 1)\,dt,$ find $F(3)$. (This is called an integral function)

Answers:

1. 8.997	2. 0.077 or 0.078	3. $\dfrac{1}{10}$	4. C
5. $\dfrac{104}{3}$	6. E		