Volumes of Rotation

Problem 1: The volume of a sphere of radius r is $V = \dfrac{4\pi}{3}r^3$. Prove this by finding the volume created by revolving the curve $y = \sqrt{r^2 - x^2}$ about the x-axis.

Problem 2: The volume of a right circular cone with base radius r and height h is given by $V = \dfrac{1}{3}\pi r^2 h$. Prove this by finding the volume created by revolving the region bound by $y = \dfrac{rx}{h}$, x-axis, and y-axis about the y-axis.

Problem 3: Find the volume formed by the surface created by rotating the area bound by the curve $y = x^{2/3}$, $x = 1$, and the x-axis about the y-axis.

Problem 4: Find the volume of the figure formed by rotating the area $y = \dfrac{5}{x^2}$, $x = 5$, $x = 1$, and the x-axis around the y-axis.

Problem 5: Find the volume created by the surface formed by rotating the area between the curves $y = 3x - 4$ and $y = x^2 - 4x + 6$ around the line $y = -2$.