Volumes

1. A hemispherical bowl of radius 12 inches is filed to a depth of 3 inches. Find the volume of water in the bowl.

2. Find the volume of the solid obtained by rotating the region bounded by $y = x^3$ and $x = 2$ around the x-axis.

3. Find the volume of the solid obtained by rotating the region bounded by $y = x^3$, $y = 8$ around the y-axis.

4. Find the volume of the solid obtained by rotating the region bounded by $y = 1 - x^2$ and $y = 0$ about the line $x = 2$.

5. Find the volume of the solid obtained by rotating the region bounded by $y = x^3$ and $x = 0$ around the x-axis.

6. Use the arc length formula to calculate the arc length of $f(x) = 1 + 3x$ from $x = 1$ to $x = 2$. Explain why your answer is comforting. It's probably easiest if you resist the urge to convert any square roots you might encounter into decimals.

7. A hemispherical bowl of radius r is filled to a depth of h. Find a formula for the formula of the volume of the water. Check your formula by examining what happens when $h \to r$.