(1) The shaded region is bounded by the curves $y = x^4 - 2x$ and $y = 3x^3 - 3x^2$ over $[0, 2]$

(a) Give an integral (do not evaluate) for the area of the region.

(b) Give an integral (do not evaluate) for the volume obtained if this region is rotated about the line $y = -3$.

(c) Give an integral (do not evaluate) for the volume obtained if this region is rotated about the line $x = 8$. 
(d) Use cylindrical shells to find the volume of a right circular cone with height $h$ and with base radius $r$. You should get $\frac{1}{3}\pi r^2 h$.

The average value of a function $f(x)$ over an interval $[a, b]$ is given by the formula

$$f(x)_{\text{avg}} = \frac{1}{b-a} \int_a^b f(x) \, dx$$

(2) Calculate the average value of $f(x) = \frac{240}{\sqrt{8x + 9}}$ on the interval $[-1, 2]$. Simplify your answer.