1. (k points) How big is the parabolic segment between the parabola $f(x) = x^2$ and the line $g(x) = 8 - 2x$?

   Sketch a graph to visualize the desired area.

Solution: The functions intersect at $P_1(-4, 16)^T$ and at $P_2(2, 4)^T$. Thus, the area is

$$A = \int_{-4}^{2} g(x) - f(x)\,\mathrm{d}x = \int_{-4}^{2} 8 - 2x - x^2\,\mathrm{d}x = \left[8 - 2x - x^2\right]_{-4}^{2} = 36.0$$