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

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

