

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

$$A = \int_{-4}^2 g(x) - f(x) \, dx = \int_{-4}^2 8 - 2x - x^2 \, dx = [8x - x^2 - \frac{1}{3}x^3]_{-4}^2 = 36.0$$

