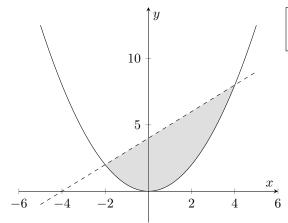
1. (k points) How big is the parabolic segment between the parabola  $f(x) = \frac{x^2}{2}$  and the line g(x) = 4 + x?

Sketch a graph to visualize the desired area.

**Solution:** The functions intersect at  $P_1(-2,2)^T$  and at  $P_2(4,8)^T$ . Thus, the area is

$$A = \int_{-2}^{4} g(x) - f(x) dx = \int_{-2}^{4} 4 + x + \left(\frac{-1}{2}\right) x^{2} dx = \left[\frac{1}{6}x(24 + 3x - x^{2})\right]_{-2}^{4} = -16 + 3x^{2} - 0.5x^{3}$$



$$f(x) = \frac{x^2}{2}$$

$$--- g(x) = 4 + x$$