5. Let $f(x) = |x|$.

(a) (4 points) Find $\int_{-2}^{1} f(x) \, dx$ using geometry (i.e., areas). Show your work on the graph below and circle your numerical answer.

(b) (4 points) Find a formula for an antiderivative of $f(x)$, given the piecewise formula

$$f(x) = |x| = \begin{cases} 
  x, & \text{if } x \geq 0 \\
  -x, & \text{if } x < 0.
\end{cases}$$

(c) (4 points) Using the Fundamental Theorem and your answer to (5b), compute $\int_{-2}^{1} f(x) \, dx$. 