1. $f(x) = -x + 2$
   a. Compute the antiderivative, $g(x)$, of $f(x) = -x + 2$
   b. Draw a careful sketch of $f(x) = -x + 2$ from $x = 0$ to $x = 3$.

For parts c) – f), complete each question using:

(i) Geometry (ii) Integrals and integral notation.

   c. Find the signed area under $f(x) = -x + 2$ from $x = 0$ to $x = 1$.
   d. Find the signed area under $f(x) = -x + 2$ from $x = 0$ to $x = 3$.
   e. Find the signed area under $f(x) = -x + 2$ from $x = 1$ to $x = 3$.
   f. Use integrals and algebra to find a positive value of *a* so that the signed area under $f(x) = -x + 2$ from $x = 0$ to $x = a$ is zero (no credit for guessing).

2. $f(x) = -x^2 + 1$
   a. Using an interval of width 0.5, sketch $f(x) = -x^2 + 1$ from $x = -2$ to $x = 3$ with left bound rectangles and sketch a second copy of $f(x) = -x^2 + 1$ from $x = -2$ to $x = 3$ with right bound rectangles. Note, some rectangles will have a height of zero.
   b. Estimate the **left,** the **right** and the **average** signed areas under $f(x) = -x^2 + 1$ from $x = -2$ to $x = 3$ using function values and your sketches from part a).
   c. How good of an estimate of the signed area from $x = -2$ to $x = 3$ do you think your average estimate is? Is your estimate a little too big or a little too small? Explain.
   d. Use calculus to exactly determine the signed area under $f(x) = -x^2 + 1$ from $x = -2$ to $x = 3$. Use integral notation.

3. $f(x) = -x(x+3)(x-2)$
   a. Completely multiply out $f(x) = -x(x+3)(x-2)$.
   b. Compute the antiderivative of $f(x)$.
   c. Draw a careful sketch of $f(x)$ and then, for each part, answer the following: Should the signed area be positive or negative?
      (i) From $x = -3$ to $x = 0$?
      (ii) From $x = 0$ to $x = 2$?
      (iii) From $x = 2$ to $x = 4$?
      (iv) From $x = -3$ to $x = 4$?
   d. Using calculus, compute each of the following:

(i) $\int_{-3}^{0} f(x)\,dx$ (ii) $\int_{0}^{2} f(x)\,dx$

(iii) $\int_{2}^{4} f(x)\,dx$ (iv) $\int_{-3}^{4} f(x)\,dx$