Ch 6.2: Finding Integrals by Signed Areas

desmos: https://www.desmos.com/calculator/w4apywsgla

1. $\int(\pi, 2\pi) \sin x\, dx$
   -2; as this is simply the base equation shifted by π. In the sine wave this corresponds to a dip opposite of the first rise.

2. $\int(0, 2\pi) \sin x\, dx$
   0; over the period $(0, 2\pi)$ the sine wave ends where it begins.

3. $\int(0, \pi/2) \sin x\, dx$
   1: 1/2 of the initial period results in 1/2 the area

4. $\int(0, 2\pi) (2 + \sin x)\, dx$
   12.57; not really sure how to explain this, but this is what I got from graphing it.

5. $\int(0, \pi) 2 \sin x\, dx$
   4; doubling the height of the original equation doubles the area.

6. $\int(2, \pi+2) \sin(x - 2)\, dx$
   2; this is just the base equation moved right by 2.

7. $\int(-\pi, \pi) \sin u\, du$
   0; the areas across the y-axis cancel each other out.

8. $\int(0, 2\pi) \sin(x/2)\, dx$
   4; this stretches the original wave's first rise out to 2π, doubling the area.

9. $\int(0, \pi) \cos x\, dx$
   0; $(0, \pi)$ on a cosine wave goes from a peak to a trough, and the areas cancel out.

10. Suppose k is any positive number. Make a conjecture about $\int(-k, k) \sin x\, dx$
    $\int(-k, k) \sin x\, dx$ will always be zero.