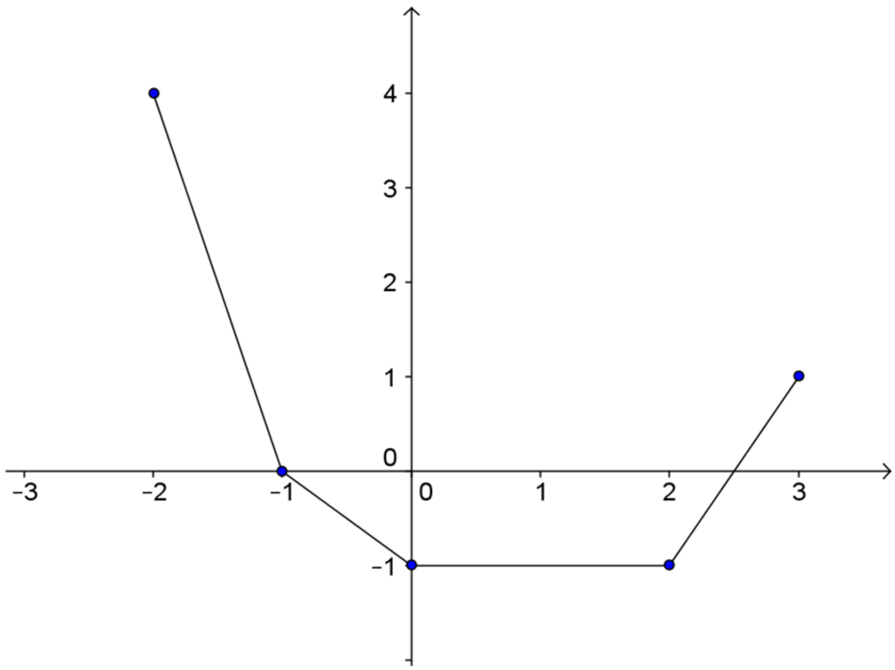
Practice Problems

1. Give the average value of $f(x)=\cos(2x)$ on the interval $\left[-\frac{\pi}{2},\frac{\pi}{4}\right]$.

2. The graph of $f(x)$ is shown below.



a. Give the area of the region bounded between the graph of $f(x)$ and the x-axis on the interval $[-2, 3]$.

b. $\int_{-2}^{3} f(x)dx =$

3. Give the average value of $f(x)=x^2-2x+4$ on the interval $[-1,2]$, and verify the conclusion of the mean value theorem for integrals for this function on this interval.

4. Sketch the region bounded between the graphs of $f(x)=3-x^2$ and $g(x)=2x$. Then find the area of the region.

5. Find the **area** bounded by the graph of $f(x)=x^3-x^2$ and the x-axis on the interval $[0,2]$.

6. Sketch the region bounded by the curves $x+y=3$ and $x=y^2+y$. Then give a formula for the area of the region involving integral(s) in x. Repeat the process with integral(s) in y. Finally, find the area of the region.

7. Sketch the region bounded between $f(x) = 2x + 3$ and $g(x) = x^2$. Rotate this region around the *y*-axis to generate a solid, and then find the volume of the solid.
8. Sketch the region **in the first quadrant** bounded between $f(x) = 2x + 3$ and $g(x) = x^2$. Rotate this region around the *y*-axis to generate a solid, and then find the volume of the solid.
9. Revolve the region bounded by the line $y = 4$ and the graph of $f(x) = x^2$ about the x-axis to generate a solid. Find the volume.
10. The region bounded between the graphs of $f(x) = x^3 - x^2$ and $g(x) = 2x$ on the interval [0,2] is rotated around the *y*-axis to generate a solid. Find the volume.
11. Sketch the region in the first quadrant bounded between the graphs of $f(x) = x + 3$ and $g(x) = (x+1)^2$. Rotate this region around the *y*-axis to generate a solid.

    a. Give a formula involving integral(s) in y for the volume generated.

    b. Give a formula involving integral(s) in x for the volume generated.

    c. Give the volume of the solid.

12. Repeat the previous problem, assuming that the region is rotated around the *x*-axis to generate a volume.

13. The base of a solid is given by the bounded between $f(x) = 2x + 3$ and $g(x) = x^2$. Cross sections taken perpendicular to the *x*-axis are squares. What is the volume of the solid.

14. The intersection of a solid with the *xy* plane is the region bounded between $f(x) = 2x + 3$ and $g(x) = x^2$. Cross section taken perpendicular to the *x*-axis are circles whose diagonals are contained in the *xy* plane. What is the volume of the solid.