

## 1 Areas Between Curves

1. Find the area of the region between the curves  $y = e^x$  and  $y = x^2 - 1$  that is bounded between  $x = -1$  and  $x = 1$ . Make a sketch of the region that is being enclosed.

2. Find the area of the region enclosed by the curves  $f(x) = x^2 - 4x$  and  $g(x) = 2x$ .

3. Find the area of the region enclosed by the curves  $x = 1 - y^2$  and  $x = y^2 - 1$ .

4. Sketch the region enclosed by the curves  $x - y = 1$  and  $y^2 = x - 1$  and find the area.

## 2 Volumes

1. Find the volume of the solid obtained by rotating the region bounded by the curves  $y = x + 1$  and  $y = 0$  and  $x = 0$  and  $x = 2$  about the x-axis. Sketch the solid and a typical disc.

2. Find the volume of the solid obtained by rotating the region bounded by the curves  $y = x^3$  and  $y = x$  with  $x \geq 0$  about the x-axis. Sketch the solid and a typical washer.

3. Find the volume of the solid obtained by rotating the region bounded by the curves  $x + y^2 = 2$  and  $x = y^2$  about the y-axis. Sketch the solid and a typical disc or washer.

4. Find the volume of the solid obtained by rotating the region bounded by the curves  $x = y^2$  and  $x = 1 - y^2$  about the line  $x = 3$ . Sketch the solid and a typical disc or washer.