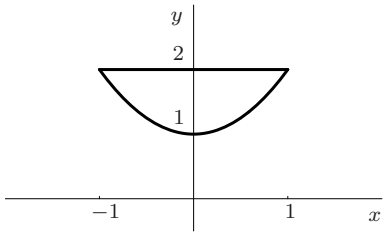
6. (18 points) A thin metal plate lying in the region bounded by the line $y = 2$ and the parabola $y = x^2 + 1$ has uniform density 5 gm/cm^2.



(a) (2 pts.) Write an integral expression giving the exact *area* of this region. *Do not* evaluate this expression.

(b) (4 pts.) Write an integral expression giving the exact *perimeter* of this region. *Do not* evaluate this expression.

(c) (5 pts.) Write a definite integral giving the exact *volume* of the solid generated by rotating the region about the x-axis. *Do not evaluate this integral*

(d) (7 pts.) Find the coordinates of the *center of mass* for this metal plate. Show your work.