**M242 Q3(c)** (S. Zhang) . Name:_____

1. Find the volume of the solid obtained by rotating the region bounded by the given cures about the $x$-axis, by both (1) rotation method and (2) cylindrical shell method.

$$x = y^2,\ x = 0,\ y = 1.$$

- **ans:** Find intersections:

$$(0,0), (0,1), (1,1)$$

(1) by the method of rotation

$$\begin{aligned} V &= \int_0^1 \pi(1^2 - (\sqrt{x})^2)dx \\ &= \pi\left(x - \frac{1}{2}x^2\right)_0^1 = \frac{1}{2}\pi \end{aligned}$$

(2) by the method of cylindrical shell

$$\begin{aligned} V &= \int_0^1 2\pi y(y^2)dy = \\ &= 2\pi\left(\frac{1}{4}y^4\right)_0^1 = \frac{1}{2}\pi \end{aligned}$$

```
p1:=plot(1,x=0..1,scaling=constrained);
p2:=plot({sqrt(x)},x=0..1);
display({p1,p2});
```