1. Answer to the vase problem

$$\text{Volume of vase} = \pi \int_0^{24} g^2(y)dy.$$

Add a row to the table to record the values of $g^2(y)$

y	0	8.0	16.0	24.0
$g(y)$	7.0	4.0	5.0	6.0
$g^2(y)$	49.0	16.0	25.0	36.0

The trapezoidal formula is

$$T_n = \frac{h}{2}\left(y_0 + 2y_1 + \cdots + 2y_{n-1} + y_n\right),$$
$$h = \frac{b-a}{n}$$

where that are n intervals and $n+1$ points, on the interval of integration $[a, b]$. In our case $n = 3, a = 0, b = 24$, $h = 8$ and the approximation of $\int_0^{24} g^2(y)dy$ is

$$\begin{aligned} T_n &= \frac{8}{2}\left(49 + 2 \times 16 + 2 \times 25 + 36\right) \\ &= 668 \end{aligned}$$

Thus the approximation to $\pi \int_0^{24} g^2(y)dy$ is 668π.