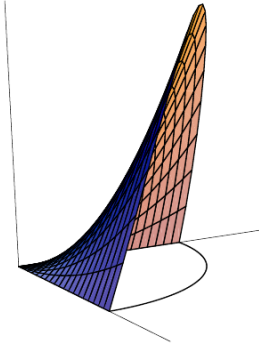**1**. (5 pts) The graph of
$$f(x, y) = 5xy$$
over the bounded region A in the first quadrant enclosed by the x, y-axes and
$$y = \sqrt{4 - x^2}$$
is the surface below. Find the volume of the solid under this graph over the region A.

2. (5 pts) Determine if the sequence $\{a_n\}$ converges, when

$$a_n = \cos\left(\frac{6\pi n^2(n + (-1)^n)}{18n^3 + 7n^2 + 4}\right)$$

and if it does, find its limit.