3. [8 points]
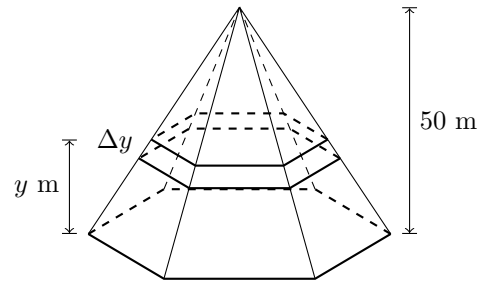Consider a tent that is 50 meters tall whose base is
a regular hexagon (i.e. a 6-sided polygon with equal
length sides and equal angles) and whose horizontal
cross-sections are also regular hexagons.
(See figure on the right.)
Suppose the perimeter of the base is 72 meters.
Let $P(y)$ be the perimeter, in meters, of a horizontal
cross section y meters above the ground.

a. [2 points] It turns out that $P(y)$ is a linear function of the variable y.
(You do not need to verify this.) Find a formula for $P(y)$.

Answer: $P(y) =$ _____

b. [3 points] The area of a regular hexagon with perimeter p is equal to $\dfrac{\sqrt{3}}{24}p^2$.

Write an expression that gives the approximate volume, in cubic meters, of a horizontal
slice of the region inside the tent that is Δy meters thick and y meters above the ground.
(Assume here that Δy is small but positive.) Your expression should <u>not</u> involve any
integrals.

Answer: Volume of slice $\approx$ _____

c. [3 points] Write, but do <u>not</u> evaluate, an expression involving one or more integrals that
gives the total volume, in cubic meters, inside the tent.

Answer: Volume $=$ _____