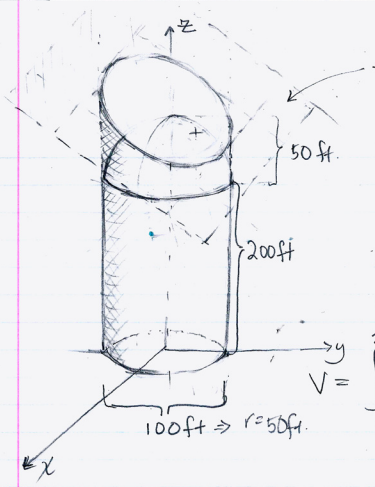


tangent plane at the point: $P(20, 20, 241)$

Equation of this tangent plane

$$z = -.485x - .485y + 260.4$$

Region $\Rightarrow$ $r = 0 \text{ to } 50$ $\theta = 0 \text{ to } 2\pi$

$$V = \int_0^{2\pi}\int_0^{50} \left(-.485(50\cos\theta) - .485(50\sin\theta) + 260.4\right) r\,dr\,d\theta$$

$$V = 2,045,180.$$

Equation of underlying dome:

$$x^2 + y^2 + (z-200)^2 = 50^2$$

$$z = \sqrt{2500 - x^2 - y^2} + 200$$

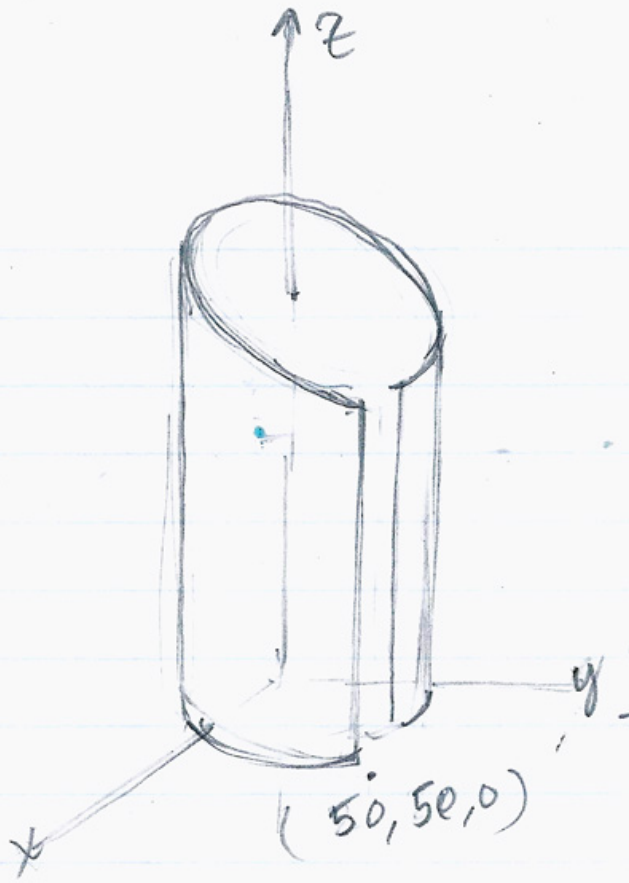
$$z_x = \tfrac{1}{2}\left(2500 - x^2 - y^2\right)^{-1/2} \cdot (-2x)$$

$$z_y = \tfrac{1}{2}\left(2500 - x^2 - y^2\right)^{-1/2} \cdot (-2y)$$

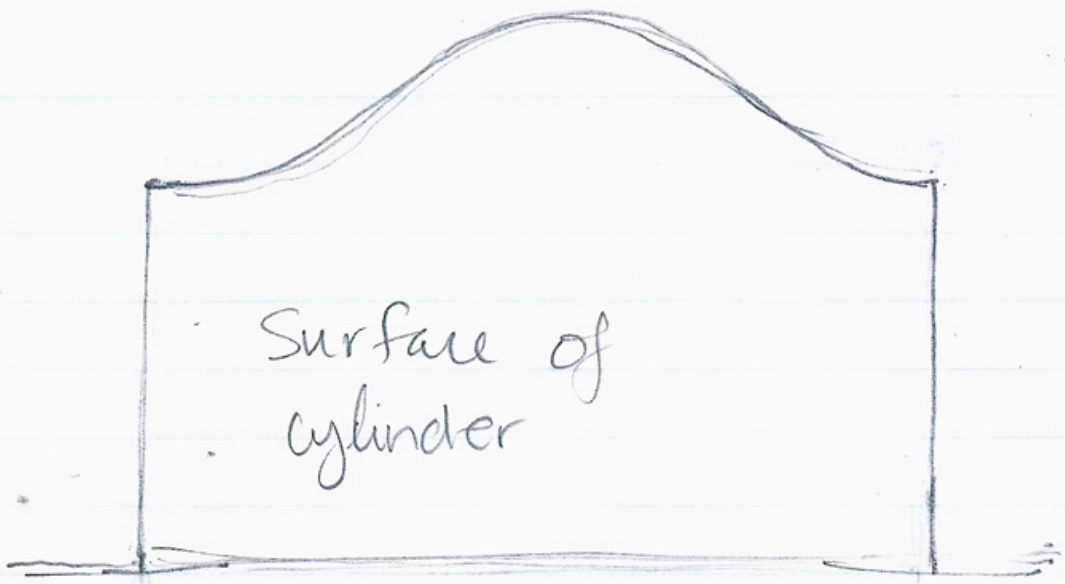
tangent plane at $(20, 20, 241)$ = $-.485(x-20) - .485(y-20) - (z-241) = 0$

Surface Area $= \iint_D \sqrt{(f_x)^2 + (f_y)^2 + 1}\, dA$ of the plane:

$$\int_0^{2\pi}\int_0^{50} \sqrt{(-.485)^2 + (-.485)^2 + 1}\; r\,dr\,d\theta = 9523.9$$



f(x) Equation(?)



$2\pi r = 100\pi$

$$\int_0^{100\pi} f(x)\,dx$$

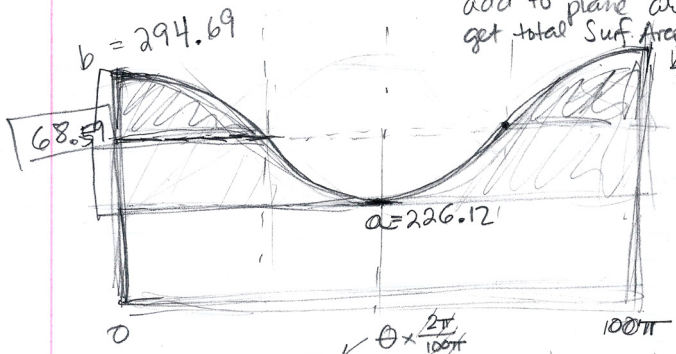
↑

?

$$\int_0^{100\pi} \left(34.3\cos\left(\frac{\theta}{50}\right) + \frac{68.59}{2} + 226.12\right) d\theta$$

$$= \boxed{181,813.4}$$

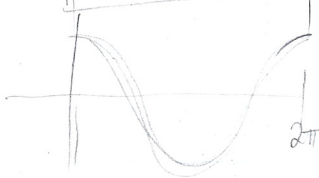
add to plane area to get total Surf Area of building



$\theta \times \frac{2\pi}{100\pi} = \frac{\theta}{50}$

$\frac{(b-a)}{2}\cos\left(\frac{\theta}{50}\right)$

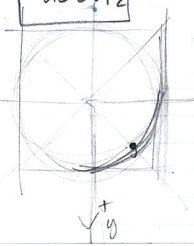
$34.3\left(\cos\frac{\theta}{50}\right)$



$+ \quad 25\sqrt{2} \quad + \quad 25\sqrt{2}$

plane $z = -.485x - .485y + 260.4$

226.12



$x = r\cos\theta$

$y = r\sin\theta$

$50\left(\frac{\sqrt{2}}{2}\right)$

$\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}$

$25\sqrt{2}$