

### Question 1

$$\int_0^{\frac{\pi}{4}} \int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \int_0^{\cos(\phi)} \rho^4 \sin(\phi) \, d\rho \, d\phi \, d\theta = \frac{\pi}{7680}$$

### Question 3

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \int_0^{\frac{\pi}{4}} \int_0^{\sec(\phi)} \rho^3 \sin(\phi) \cos(\phi) \, d\rho \, d\phi \, d\theta = \frac{\pi}{8}$$

### Question 4

$$\int_0^{2\pi} \int_0^{2\pi} \int_0^6 \rho^3 \sin^2(\phi) \, d\rho \, d\phi \, d\theta = 648 \pi^2$$

$$x \rightarrow \frac{\int_0^{2\pi} \int_0^{2\pi} \int_0^6 \rho^3 \sin^2(\phi) \cdot \rho \cdot \sin(\phi) \cos(\phi) \, d\rho \, d\phi \, d\theta}{\int_0^{2\pi} \int_0^{2\pi} \int_0^6 \rho^3 \sin^2(\phi) \, d\rho \, d\phi \, d\theta} = 0$$

$$y \rightarrow \frac{\int_0^{2\pi} \int_0^{2\pi} \int_0^6 \rho^3 \sin^2(\phi) \cdot \rho \cdot \sin(\phi) \sin(\phi) \, d\rho \, d\phi \, d\theta}{\int_0^{2\pi} \int_0^{2\pi} \int_0^6 \rho^3 \sin^2(\phi) \, d\rho \, d\phi \, d\theta} = \frac{18}{5}$$

$$z \rightarrow \frac{\int_0^{2\pi} \int_0^{2\pi} \int_0^6 \rho^3 \sin^2(\phi) \cdot \rho \cdot \cos(\phi) \, d\rho \, d\phi \, d\theta}{\int_0^{2\pi} \int_0^{2\pi} \int_0^6 \rho^3 \sin^2(\phi) \, d\rho \, d\phi \, d\theta} = 0$$