

8. Find the equation of the sphere whose center is $(2, 4, 5)$ and which is tangent to the xy -plane.

The point $(2, 4, 0)$ is on the sphere, so the sphere has radius 5

The sphere is

$$(x-2)^2 + (y-4)^2 + (z-5)^2 = 25$$

9. Find the work done by the force $\vec{F} = 3\vec{i} - 6\vec{j} + 7\vec{k}$ as it moves an object in a straight line from $(2, 1, 3)$ to $(9, 4, 6)$. Force is measured in pounds. Distance is measured in feet.

$$\begin{aligned} \text{Work} &= \vec{F} \cdot \overrightarrow{(2,1,3)(9,4,6)} = (3\vec{i} - 6\vec{j} + 7\vec{k}) \cdot (7\vec{i} + 3\vec{j} + 3\vec{k}) \\ &= 21 - 18 + 21 = 24 \text{ foot-pounds} \end{aligned}$$