Name:
Section: **Show all your work to get credit!**

1. (a) Find an equation of the sphere with center $(1, -12, 6)$ and radius 10.

   (b) Write an equation to describe its intersection with the $xy-$ coordinate planes. (If the sphere does not intersect the plane, then indicate why)

2. Find the unit vectors (in $\mathbb{R}^2$) that are perpendicular to the tangent line to the curve $y = 8\sin x$ at the point $(\pi/6, 4)$. (There should be two answers)

Reading Question:

Of the following expressions circle all those that are **vector-valued functions**.

$$x^2 + y^2 = 2, \ y - z = 3$$

$$r(t) = \langle t, t + 1, t^2 \rangle$$

$$x = 1 + t, \ y = 2 + 5t, \ z = -1 + 6t$$

$$r(t) = \cos t\mathbf{i} + \sin t\mathbf{j} + t\mathbf{k}$$