One of the following questions will serve as a problem in quiz 2:

1. Given vector $\vec{\mathbf{a}} = \langle a_1, a_2, a_3 \rangle$, what is its magnitude?

2. Let θ be the angle between vectors $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$. What is $\vec{\mathbf{a}} \circ \vec{\mathbf{b}}$?

3. Let $\vec{\mathbf{a}} = \langle a_1, a_2, a_3 \rangle$, $\vec{\mathbf{b}} = \langle b_1, b_2, b_3 \rangle$. Write the formula for $\vec{\mathbf{a}} \circ \vec{\mathbf{b}}$ in terms of $a_1, a_2, a_3, b_1, b_2, b_3$.

4. Given vector $\vec{\mathbf{a}}$, find the unit vector $\vec{\mathbf{u}}$ having the same direction.

5. Write the formula for the scalar projection of $\vec{\mathbf{a}}$ onto $\vec{\mathbf{b}}$.

6. Write the formula for the vector projection of $\vec{\mathbf{a}}$ onto $\vec{\mathbf{b}}$.

7. Let θ be the angle between vectors $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$. What is $|\vec{\mathbf{a}} \times \vec{\mathbf{b}}|$?

8. Let $\vec{\mathbf{a}} = \langle a_1, a_2, a_3 \rangle$, $\vec{\mathbf{b}} = \langle b_1, b_2, b_3 \rangle$. Write the formula for $\vec{\mathbf{a}} \times \vec{\mathbf{b}}$ in terms of $a_1, a_2, a_3, b_1, b_2, b_3$.

9. What is the scalar triple product of vectors $\vec{\mathbf{a}} =$, $\vec{\mathbf{b}}$, and $\vec{\mathbf{c}}$?

10. Let $\vec{\mathbf{a}} = \langle a_1, a_2, a_3 \rangle$, $\vec{\mathbf{b}} = \langle b_1, b_2, b_3 \rangle$, $\vec{\mathbf{c}} = \langle c_1, c_2, c_3 \rangle$. Write the formula for the scalar triple product of these vectors.

11. Write the formula for the area of parallelogram formed by vectors $\vec{\mathbf{a}}$, $\vec{\mathbf{b}}$.

12. Write the formula for the volume of parallelepiped formed by vectors $\vec{\mathbf{a}}$, $\vec{\mathbf{b}}$, $\vec{\mathbf{c}}$.

13. Write the equation of the line with directional vector $\vec{\mathbf{v}}$, going through point $P(x_0, y_0, z_0)$:
(a) in vector form (b) in parametric form (c) in symmetric form.

14. Write the equation of the plane with normal vector $\vec{\mathbf{n}}$ going through point $P(x_0, y_0, z_0)$:
(a) in vector form (b) in scalar form.

15. Write the equation of tangent line to the curve $\vec{\mathbf{r}}(t)$ at point $P(x_0, y_0, z_0)$.

16. Write the formula for the length of curve $\vec{\mathbf{r}}(t)$ if $a \leq t \leq b$.

17. Let $\vec{\mathbf{r}}(t)$ be the position vector of a particle. Write the formula for its velocity $\vec{\mathbf{v}}(t)$ and acceleration $\vec{\mathbf{a}}(t)$.

18. Let $\vec{\mathbf{v}}(t)$ be the velocity of a particle. Write the formula for its position vector $\vec{\mathbf{r}}(t)$ if at time t_0 the particle was located at point P with radius-vector $\vec{\mathbf{r}}_0$.