Math 252 Quiz 1 (Problems)

1. Find the center and radius of the sphere given by $x^2 + y^2 + z^2 - 8x + 6x = 0$

2. Using $\mathbf{u} = \langle 8, 3, -5 \rangle, \mathbf{v} = \langle 4, -4, -2 \rangle$,

    a. Find $3u - 4v$.

    b. Find $\|\mathbf{u}\|, \|\mathbf{v}\|$.

Math 252 Quiz 1 (Answers)

1. $C(4, -3, 0), \rho = 5$

2. a. $\langle 8, 25, -7 \rangle$.
   b. $\|\mathbf{u}\| = 7\sqrt{2}, \|\mathbf{v}\| = 6$.

Math 252 Quiz 2 (Problems)

1. Using $\mathbf{u} = \langle 8, -4, 1 \rangle$ and $\mathbf{v} = \langle -4, 4, 2 \rangle$,
    a. Find $\|\mathbf{u}\|$ and $\|\mathbf{v}\|$.
    b. Find $\mathbf{u} \cdot \mathbf{v}$.
    c. Find the angle θ between $\mathbf{u}$ and $\mathbf{v}$.
    d. Find $\text{proj}_{\mathbf{v}}\mathbf{u}$.
    e. Find $\mathbf{u} \times \mathbf{v}$.

Math 252 Quiz 2 (Answers)

1. a. $\|\mathbf{u}\| = 9, \|\mathbf{v}\| = 6$
   b. $\mathbf{u} \cdot \mathbf{v} = -46$
   c. $\theta = \arccos\left(-\frac{23}{27}\right) = 148.4°$
   d. $\text{proj}_{\mathbf{v}}\mathbf{u} = \left(-\frac{23}{18}\right)\langle -4, 4, 2\rangle = \langle -\frac{46}{9}, -\frac{46}{9}, -\frac{23}{9}\rangle$
   e. $\mathbf{u} \times \mathbf{v} = \langle -12, -20, 16\rangle$

Math 252 Quiz 3 (Problems)

1. Using $P(-2,0,3), Q(1,2,4), R(-3,1,0)$,

   a. Find a vector orthogonal to the plane determined by P, Q and R.

   b. Find an equation of the plane passing through P, Q and R.

   c. Find the set of parametric equations for the line through Q and parallel to $\mathbf{a} = \langle 4, -3, -2 \rangle$.

   d. Find the distance from the point $(-4, -1, 5)$ to the plane passing through P, Q and R.

Math 252 Quiz 3 (Answers)

1. a. $\mathbf{n} = \mathbf{PQ} \times \mathbf{PR} = \langle -7, 8, 5 \rangle$
   b. $-7x + 8y + 5z = 29$
   c. $x = 1 + 4t, y = 2 - 3t, z = 4 - 2t; t \in \mathbb{R}$
   d. $D = \frac{16}{\sqrt{138}}$

Math 252 Quiz 4 (Problems)

1. Indentify via cross-sections the surface defined by $3^2 - y^2 + 3z^2 + 9 = 0$.

2. Indentify via cross-sections the surface defined by $x = 3y^2 + 5z^2$.

3. Indentify via cross-sections the surface defined by $y = x^2$.

4. Indentify via cross-sections the surface defined by $2y^2 = 3z^2 = 12$.

Math 252 Quiz 4 (Answers)

1. Circular hyperboloid of two sheets
2. Elliptical paraboloid
3. Parabolic cylinder
4. Elliptical cylinder

Math 252 Quiz 5 (Problems)

1. Using $r(t) = \langle \cos t, \sin t, t^2 \rangle$, $t = \frac{\pi}{2}$:
   a. Find the velocity vector.
   b. Find the acceleration vector.

2. A projectile is fired at a speed of 448 feet per second at and angle of 30 degrees from a tower 512 feet above the ground.
   a. Give the position vector for any time t.
   b. How far away will the object strike?

Math 252 Quiz 5 (Answers)

1. a. $\mathbf{v}(t) = \langle -\sin t, \cos t, 2t \rangle$, $\mathbf{v}(\frac{\pi}{2}) = \langle -1, 0, \pi \rangle$

   b. $\mathbf{a}(t) = \langle -\cos t, -\sin t, 2 \rangle$, $\mathbf{a}(\frac{\pi}{2}) = \langle 0, -1, 2 \rangle$

2. a. $\mathbf{r}(t) = \langle 224\sqrt{3}t, -16t^2 + 224t + 512 \rangle$

   b. $T = 16$, $x(16) = 224\sqrt{3}(16) \doteq 6207.7$ feet

Math 252 Quiz 6 (Problems)

1. Using $\mathbf{r}(t) = \langle 4\cos(2t), 4\sin(2t), 6t\rangle$,
    a. Find $\mathbf{T}(t)$
    b. Find $\mathbf{N}(t)$
    c. Find the curvature

Math 252 Quiz 6 (Answers)

1. a. $\mathbf{T}(t) = \langle -\frac{4}{5}\sin(2t), \frac{4}{5}\cos(2t), \frac{3}{5}\rangle$
   b. $\mathbf{N}(t) = \langle -\cos(2t), \sin(2t), 0\rangle$
   c. $k = \frac{4}{25}$

Math 252 Quiz 7 (Problems)

1. Find the tangential and normal components of acceleration for the curve $\mathbf{r}(t) = \langle 3t^2, 4t^2, 10t \rangle$ at $t = 2$ and express a in terms of T and N.

Math 252 Quiz 7 (Answers)

1. $\mathbf{a} = 4\sqrt{5}\mathbf{T} + 2\sqrt{5}\mathbf{N}$
   (correction?) $\mathbf{a} = \frac{20}{\sqrt{5}}\mathbf{T} + \frac{10}{\sqrt{5}}\mathbf{N}$