MATH 2130 Test 1 Winter 2012 60 minutes

10 1. Find the equation of the plane containing the lines

$$x = 2t, \quad y = 4 - 3t, \quad z = 3 + t; \qquad \text{and} \qquad x + 2y - 3z = -8, \quad 3x - y + z = 9.$$

Simplify the equation as much as possible.

10 2. Find the distance between the lines $x = 2 + 4t$, $y = 1 + 7t$, $z = -3 + 5t$ and $2x + y - 3z = 8$, $x - 2y + 2z = -1$.

8 3. Find the length of the curve

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

between the points $(1, 4, -1)$ and $(1, 2, -1)$.

8 4. Find a unit tangent vector to the curve

$$x^2 + y = 4, \quad z - 3x = 5,$$

at the point $(-2, 0, -1)$. Coordinate z must decrease along the curve.

4 5. Show that if $f(t) < 0$ for $-1 \le t \le 2$, then the curve

$$x = 2f(t)\cos t, \quad y = 3f(t)\sin t, \quad z = f(t),$$

lies on a cone. What is the equation of the cone?

Answers by Daivit (plankion@yahoo.com)

1. $31x + 13y - 23z + 17 = 0$

2. $\dfrac{\sqrt{314}}{3\sqrt{10}}$

3. $\dfrac{2}{27}\left[17\sqrt{17} - 16\sqrt{2}\right]$

4. $-\dfrac{1}{\sqrt{26}}\hat{\imath} - \dfrac{4}{\sqrt{26}}\hat{\jmath} - \dfrac{3}{\sqrt{26}}\hat{k} = -\dfrac{1}{\sqrt{26}}\left(\hat{\imath} + 4\hat{\jmath} + 3\hat{k}\right)$

5. $z = -\sqrt{\dfrac{x^2}{4} + \dfrac{y^2}{9}}$