MATH 2130 Test 1 Winter 2012 **60 minutes**

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

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

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?