Math 2211: Recitation 4 (T)

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(1) Solve any **two** the following problems:

(a) Find the distance between the given parallel planes:

$$5x - 2y + z = 10, \quad 10x - 4y + 2z = 3$$

(b) Find the domain of the vector function

$$\mathbf{r}(t) = \ln(t-1)\mathbf{i} + \tan(t)\mathbf{j} + \frac{9t^2 - 1}{t - \frac{1}{3}}\mathbf{k}.$$

(c) Find the limit $\lim_{t\to 0} \mathbf{r}(t)$ where

$$\mathbf{r}(t) = \frac{e^t - t - 1}{t^2}\mathbf{i} + \frac{t^2}{\sin^2(t)}\mathbf{j} + (t^2 + t - 2)\mathbf{k}.$$

(2) Solve the following problems. **(Do any two of them)**.

(a) Find the parametric equation for the line of intersection of the planes $x + 2y + 3z = 3$ and $x - y + z = 3$.

(b) Find an equation of the plane that contains the curve with the given vector equation $\mathbf{r}(t) = \langle 4t, sin(t), t - 10\rangle$.

(c) At what points does the curve $\mathbf{r}(t) = \langle t, 0, 5t - t^2\rangle$ intersects the paraboloid $z = x^2 + y^2$.

(Bonus) Solve the following integrals. **(Do any one of them)**.

(a) If $\mathbf{r}(t) = \langle e^{2t}, e^{-5t}, t\rangle$, find $\mathbf{r}'(0), \mathbf{r}''(0)$, $\mathbf{r}'(0) \times \mathbf{r}''(0)$ and $\mathbf{T}(0) = \frac{\mathbf{r}'(0)}{|\mathbf{r}'(0)|}$.

(b) Find $f(4)$, where $f(t) = \mathbf{u}(t) \cdot \mathbf{v}(t)$, $\mathbf{u}(3) = \langle 1, 3, -3\rangle$, $\mathbf{u}'(3) = \langle 9, 1, 7\rangle$ and $\mathbf{v}(t) = \langle t^2, t, t^3\rangle$.