- other side

13. FOR $\vec{X}(t) = \sin t\,\vec{i} + \cos t\,\vec{j} + e^t\,\vec{k}$, FIND FOR ALL t THE VELOCITY, SPEED, ACCELLERATION AND $\vec{T}$

14. BEFORE STARTING THIS PROBLEM SUBSTITUTE $t=0$ IN THE EQUATIONS OF * 13 TO OBTAIN $\vec{X}(0), \vec{X}'(0), |\vec{X}'(0)|, \vec{X}''(0), \vec{T}(0)$, USING THESE VECTORS (OR ANY OTHER METHOD) FIND AT $t=0$ $\vec{A}_T, \vec{A}_N, \vec{N}$ & $\vec{B}$.

15. AGAIN USING THE VECTORS AT THE START OF * 14 (OR ANY OTHER METHOD) FIND AT $t=0$ THE SCALAR K, THE RADIUS OF CURVATURE, THE EQUATION OF THE TANGENT LINE AND THE EQUATION OF THE KISSING PLANE

16. FIND THE MIN & MAX VALUES OF $f(x,y) = x^2+y^2-2x-2y$ IN THE CLOSED REGION $x^2+y^2 \le 8$ [HINT TO CHECK THE BOUNDRY CHANGE f TO POLAR CO-ODINATES SO $r \le 2\sqrt{2}$].

17. & 18: $\ell_1 : \vec{X} = (4\vec{i}+\vec{k}) + s(2\vec{i}-2\vec{j}-\vec{k})$ $\ell_2 : \vec{X} = (-\vec{i}+\vec{j}+\vec{k}) + t(\vec{i}-\vec{k})$

17. USING VECTOR METHOD'S, FIND THE DISTANCE BETWEEN ℓ_1 & ℓ_2

18. USING CALCULUS, FIND THE CO-ODINATES OF THE POINT ON EACH LINE NEAREST THE OTHER.

19. FIND THE EQUATION OF THE PLANE P IF
   (i) P IS PARALLEL TO THE TANGENT PLANE OF $z = x^3+2xy+y^2$ AT (1,1)
   and
   (ii) P PASSES THROU THE POINT Q WHERE Q IS
      (a) ON THE TANGENT LINE TO THE CURVE $\vec{X} = \vec{i} + t\vec{j} + \frac{t^2}{2}\vec{k}$ AT $t=0$
      and
      (b) ON THE PLANE $x+y+z=3$.

20. THE FUNCTION $f(x,y) = x^3+xy^2-9x$ HAS 4 CRITICAL POINTS, FIND THEM AND USE THE SECOND DERIVATION TEST ON EACH TWO DETERMINE IF IT IS REL. MIN, REL. MAX, SADDLE, OR THE TEST FAILS. [HINT f_y FACTORS].

HAVE A MERRY & A HAPPY