1. Consider the points $A(2,1,-1)$, $B(-1,3,0)$, $C(1,-2,3)$

(a) Find the cosine of angle $ABC$

(b) Find a point $D$ such that $ABCD$ is a parallelogram.

(c) Find the area of this parallelogram.

2. Sketch (in the x-y plane) contour lines for the following surface: $z = \frac{x}{x^2+y^2}$. Describe the surface in one or two sentences.

3. Does $\lim_{(x,y) \to (0,0)} \sin(x/y)$ exist?

4. For the motion described by $F(t) = (t^2 - 1, 2t + 1, t - t^2)$ is it ever true that the velocity and acceleration vectors are perpendicular at some point of time?

5. For $f(x,y,z) = x^2y^3z^4$, calculate $f_u'(0,1,2)$ for $u = (-1,4,8)$

6. Find a general formula for $\frac{d^2w}{dt^2}$ when $w = g(st, bt, ct)$

7. Find the minimum and maximum value for the function $f(x,y) = x^2 - y^2 - 6xy + x + 2y$ on the closed square region with opposite vertices $(0,0)$ and $(1,1)$.

8. Find the equation of the tangent plane to the surface $xyz = 6$ at the point $(3,-1,-2)$.