

1.

$$df|_p = 1dx + (-2)dy + 3dz$$

$$3x^2 dx - 2y dy + 1 dz = 0$$

$$dz = 2y dy - 3x^2 dx$$

$$dz|_p = 4dy - 27dx$$

$$\Rightarrow dg|_p = dx - 2dy + 12dy - 8dx$$

$$= -8dx + 10dy$$

$$\nabla g|_p = \langle -8, 10 \rangle$$