

$$1) P = (1, 2) \quad Q = (-1, -1)$$

$$G = \langle x^2, x \rangle$$

$$F(1, 2) = (1, 1)$$

$$F(-1, -1) = (1, -1)$$

Maple sketch.

$$2) P = (0, 1, 1), \quad Q = (2, 1, 0)$$

$$F = \langle xy, z^2, x \rangle$$

$$F(0, 1, 1) = \langle 0, 1, 0 \rangle$$

$$F(2, 1, 0) = \langle 2, 0, 2 \rangle$$

Maple sketch

$$3) F = \langle 1, 0 \rangle \text{ for } -3 \leq x \leq 3$$
$$-3 \leq y \leq 3$$

Sketch on maple

$$4) F = xi \text{ for } -3 \leq x \leq 3$$
$$-3 \leq y \leq 3$$

Maple sketch

$$5) F = \langle 0, x \rangle \text{ for } -3 \leq x \leq 3$$
$$F(x, y) = \langle 0, x \rangle \text{ for } -3 \leq y \leq 3$$

Maple sketch

$$11) F = \left\langle \frac{x}{x^2+y^2}, \frac{y}{x^2+y^2} \right\rangle$$

$$\text{for } -3 \leq x \leq 3 \\ -3 \leq y \leq 3$$

Maple sketch

$$23) F = \langle xy, yz, y^2 - x^2 \rangle$$

$$\text{curl} = \nabla \times F$$

$$= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ \frac{d}{dx} & \frac{d}{dy} & \frac{d}{dz} \\ xy & yz & y^2 - x^2 \end{vmatrix}$$

Using determinants on maple,

$$\text{curl} = \langle y, 3x^2, -x \rangle$$

$$\text{div} F = \frac{d}{dx}(xy) + \frac{d}{dy}(yz) + \frac{d}{dz}(y^2 - x^2)$$

$$\text{div} F = y + z \rightarrow \text{Using Maple}$$

$$25) F = \langle x - 2zx^2, z - xy, z^2 - x^2 \rangle$$

$$\text{curl} F = \text{Using formula \& maple}$$

$$= \langle -1, 2x^2 - 2xz^2, -y \rangle$$

$$\text{div}(F) = 1 - 4xz - 2 + 2x^2z$$

$$27) F = \langle x - y^2, x + z^3, y + x^2 \rangle$$

$$\text{curl}(F) = \langle -3z^2, 1 - 2x, 1 + 2y \rangle$$

$$\text{div}(F) = 0$$

27) Ans: plot C