

$$6. f(x, y) = 5x^2 - y^3 \quad (3, 1)$$

$$\begin{aligned}\nabla F(x, y) &= f_x \vec{i} + f_y \vec{j} \\ &= 10x \vec{i} + (-3y^2) \vec{j} \\ &= 10(3) \vec{i} - 3(1)^2 \vec{j} \\ &= \boxed{30 \vec{i} - 3 \vec{j}}\end{aligned}$$

$$7. f(x, y) = \sin(x^3 - y) \quad (1, 2)$$

$$\begin{aligned}\nabla F(x, y) &= f_x \vec{i} + f_y \vec{j} \\ &= (\cos(x^3 - y) \cdot 3x^2) \vec{i} + (\cos(x^3 - y) \cdot (-1)) \vec{j} \\ &= 3x^2 \cos(x^3 - y) \vec{i} - \cos(x^3 - y) \vec{j} \\ &= 3(1)^2 \cos(1^3 - 2) \vec{i} - \cos(1^3 - 2) \vec{j} \\ &= 3 \cos(-1) \vec{i} - \cos(-1) \vec{j} \\ &= \boxed{3 \cos(1) \vec{i} - \cos(1) \vec{j}} \\ &= \cos(1) [3 \vec{i} - \vec{j}]\end{aligned}$$