b) $u = x^3 + xy^2 + 2yz^2$

$f_x = 3x^2 + y^2$

$f_y = 2xy + 2z^2$

$f_z = 4yz$

$du = (3x^2 + y^2)\,dx + (2xy + 2z^2)\,dy + (4yz)\,dz$

c) $z = \sin(x^2 + y^2)$

$f_x = \cos(x^2 + y^2) \cdot 2x$

$f_y = \cos(x^2 + y^2) \cdot 2y$

$dz = [\cos(x^2 + y^2) \cdot 2x]\,dx + [\cos(x^2 + y^2) \cdot 2y]\,dy$