(41) $x + 2y + 3z = 1 \quad x^2 + y^2 = 3$

$z = \frac{1}{3}(1 - x - 2y) \qquad \frac{\partial z}{\partial x} = -\frac{1}{3} \quad \frac{\partial z}{\partial y} = -\frac{2}{3} \quad \sqrt{1 + \frac{1}{9} + \frac{4}{9}} = \frac{\sqrt{14}}{3}$

$A(S) = \frac{\sqrt{14}}{3} \iint_D dA \qquad x^2 + y^2 = 3 \quad r = \sqrt{3}$

$\iint_D dA =$ cylinder inside area $= \pi r^2 = \pi(\sqrt{3})^2 = 3\pi$

$A(S) = \frac{\sqrt{14}}{3}(3\pi) = \boxed{\pi\sqrt{14}}$

(43) $z = \frac{2}{3}(x^{3/2} + y^{3/2}) \quad x \in [0,1] \quad y \in [0,1]$

$\frac{\partial z}{\partial x} = \sqrt{x} \qquad \frac{\partial z}{\partial y} = \sqrt{y} \qquad \sqrt{1 + x + y}$

$A(S) = \int_0^1 \left( \int_0^1 \sqrt{1+x+y}\, dx \right) dy = \int_0^1 \left( \frac{2}{3}(1+x+y)^{3/2} \Big]_0^1 \right) dy$

$= \int_0^1 \frac{2}{3}(2+y)^{3/2} - \frac{2}{3}(1+y)^{3/2}\, dy$

$= \frac{2}{3}\left[ \frac{2}{5}(2+y)^{5/2} - \frac{2}{5}(1+y)^{5/2} \right]_0^1 =$

$\frac{4}{15}\left[ 3^{5/2} - 2^{5/2} - 2^{5/2} + 1 \right] =$

$\boxed{\frac{4}{15}\left[ 3^{5/2} - 2^{7/2} + 1 \right]}$