Question1:

$$dr =< 3t^2, 4t, \pi >$$

$$\frac{\partial \phi}{\partial x} = y^2 \sin(z) - z, \frac{\partial \phi}{\partial y} = 2xy \sin(z), \frac{\partial \phi}{\partial z} = xy^2 \cos(z) - x$$

$$\phi_x = \int y^2 \sin(z) - z \, dx = (y^2 \sin(z) - z)x + g(y) + h(z)$$

$$\phi_y = \int 2xy \sin(z) \, dy = xy^2 \sin(z) + f(x) + h(z)$$

$$\phi_z = \int xy^2 \cos(z) - x \, dz = xy^2 \sin(z) + f(x) + g(y)$$

$$\phi(x, y, z) = xy^2 \sin(z) - xz$$

$$r(0) =< 0, -1, 0 >, r\left(\frac{1}{2}\right) =< \frac{1}{8}, -0.5, \frac{\pi}{2} >$$

Question 7:

Question 14:

$$W =$$