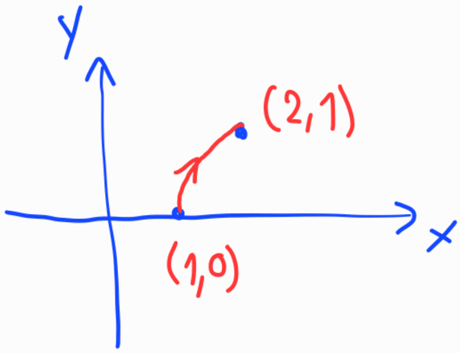
$\boxed{16.2}$ (40) $F(x,y) = (x^2, ye^x)$, $\sigma(t) = (t^2+1, t)$

$t \in [0,1]$



$\sigma'(t) = (2t, 1)$

$F(\sigma(t)) =$

$= F(t^2+1, t) =$

$= ((t^2+1)^2, te^{t^2+1})$

$$W = \int_\sigma F\,d\sigma = \int_0^1 F(\sigma(t)) \cdot \sigma'(t)\,dt =$$

$$= \int_0^1 \left((t^2+1)^2, te^{t^2+1}\right) \cdot (2t, 1)\,dt =$$

$$= \int_0^1 \left(2t(t^2+1)^2 + te^{t^2+1}\right) dt =$$

$$= \left[\frac{(t^2+1)^3}{3} + \frac{e^{t^2+1}}{2}\right]_0^1 = \frac{2^3}{3} + \frac{e^2}{2} - \frac{1}{3} - \frac{e}{2} =$$

$$= \frac{7}{3} + \frac{e^2}{2} - \frac{e}{2}.$$

(41) $F(x,y,z) = (x-y^2, y-z^2, z-x^2)$, $\sigma(t) = (2t, t, 1-t)$

$t \in [0,1]$

$$F(\sigma(t)) = (2t - t^2, \; t - (1-t)^2, \; 1 - t - 4t^2) =$$

$$= (2t - t^2, \; 3t - t^2 - 1, \; 1 - t - 4t^2)$$

$$\sigma'(t) = (2, 1, -1)$$

$$F(\sigma(t)) \cdot \sigma'(t) = 4t - 2t^2 + 3t - t^2 - 1 - 1 + t + 4t^2 =$$

$$= t^2 + 8t - 2$$

$$\int_\sigma F \, d\sigma = \int_0^1 (t^2 + 8t - 2) \, dt = \left[\frac{t^3}{3} + 4t^2 - 2t \right]_0^1 =$$

$$= \frac{1}{3} + 4 - 2 = 2 + \frac{1}{3} = \frac{7}{3}.$$

$\boxed{16.6}$ 47 $\displaystyle\int_0^1 \sqrt{17 + 4z^2} \, dz =$

$$z = \frac{\sqrt{17}}{2} \operatorname{tg} u, \qquad u \in \left[0, \operatorname{arctg}\left(\frac{2}{\sqrt{17}}\right)\right]$$

$$\sqrt{17 + 4z^2} = \sqrt{17(1 + \operatorname{tg}^2 u)} = \sqrt{17} \cdot |\sec u| = \sqrt{17} \sec u$$

$$\frac{dz}{du} = \frac{\sqrt{17}}{2} \cdot \sec^2 u$$

$$= \int_0^{\operatorname{arctg}\left(\frac{2}{\sqrt{17}}\right)} \sqrt{17} \sec u \cdot \frac{\sqrt{17}}{2} \sec^2 u \, du = \frac{17}{2} \int_0^{\operatorname{arctg}\left(\frac{2}{\sqrt{17}}\right)} \sec^3 u \, du =$$

$$= \left[\frac{1}{2} \operatorname{tg} u \sec u + \frac{1}{2} \int_0^{\operatorname{arctg}\left(\frac{2}{\sqrt{17}}\right)} \sec u \, du \right]_0^{\operatorname{arctg}\left(\frac{2}{\sqrt{17}}\right)} \cdot \frac{17}{2} =$$

$$= \frac{17}{2} \left[\frac{1}{2} \operatorname{tg} u \sec u \right]_0^{\operatorname{arctg}\left(\frac{2}{\sqrt{17}}\right)} + \frac{17}{4} \left[\ln \left| \sec u + \operatorname{tg} u \right| \right]_0^{\operatorname{arctg}\left(\frac{2}{\sqrt{17}}\right)} =$$

$$= \frac{17}{2} \left[\frac{1}{2} \operatorname{tg} u \sec u \right]_0^{\operatorname{arctg}\left(\frac{2}{\sqrt{17}}\right)} + \frac{17}{4} \ln\left(\frac{2 + \sqrt{21}}{\sqrt{17}} \right) =$$

$$= \frac{\sqrt{21}}{2} + \frac{17}{4} \ln\left(\frac{2+\sqrt{21}}{\sqrt{17}} \right)$$