(4)

(3)

(9.)

(7.) $\frac{dw}{dt} = \nabla f \cdot \vec{r}\,'(t)$

$\nabla f = \overrightarrow{(2xy, x^2, \cos z)}$

$\vec{r}\,'(t) = \overrightarrow{(2t, 2t, \pi)}$

$\vec{r}\,'(1) = \overrightarrow{(2, 2, \pi)}$

$\vec{r}\,(1) = \overrightarrow{(1, 1, \pi)}$

so $\nabla f(\overrightarrow{1, 1, \pi}) = \overrightarrow{(2, 1, \cos\pi)} = \overrightarrow{(2, 1, -1)}$

$\nabla f(\overrightarrow{1, 1, \pi}) \cdot \overrightarrow{(2, 2, \pi)} = \overrightarrow{(2, 1, -1)} \cdot \overrightarrow{(2, 2, \pi)}$

$= 4 + 2 - \pi = 6 - \pi$ (d)

(8.) $f(x) = \sum_{k=3}^{\infty} 2x^k = 2\sum_{k=3}^{\infty} x^k = 2\,\frac{x^3}{1-x}$

$f(-\tfrac{1}{2}) = 2\,\frac{(-\frac{1}{2})^3}{1-(-\frac{1}{2})} = 2\,\frac{-1/8}{3/2} = 2 \cdot \frac{2}{3} \cdot \left(-\frac{1}{8}\right)$

$= -\frac{1}{6}$ (c)