2.(5) 解. 计算可得

$$y' = (x^2)' \ln x + x^2(\ln x)' = 2x\ln x + x^2 \cdot \frac{1}{x} = 2x\ln x + x. \qquad \blacksquare$$

2.(10) 解. 计算可得

$$\begin{aligned} s' &= \frac{(1+\sin t)'(1+\cos t) - (1+\sin t)(1+\cos t)'}{(1+\cos t)^2} \\ &= \frac{\cos t(1+\cos t) - (1+\sin t)(-\sin t)}{(1+\cos t)^2} \\ &= \frac{\cos t + \cos^2 t + \sin t + \sin^2 t}{(1+\cos t)^2} \\ &= \frac{\cos t + \sin t + 1}{(1+\cos t)^2}. \end{aligned} \qquad \blacksquare$$

6.(3) 解. 令 $y = \mathrm{e}^u, u = -3x^2$, 则函数 $y = \mathrm{e}^{-3x^2}$ 可以看成它们的复合，从而由链式法则可得

$$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{\mathrm{d}y}{\mathrm{d}u}\frac{\mathrm{d}u}{\mathrm{d}x} = \mathrm{e}^u \cdot (-6x) = -6x\mathrm{e}^{-3x^2}. \qquad \blacksquare$$

6.(8) 解. 计算可得

$$y' = \frac{1}{1+(\mathrm{e}^x)^2} \cdot (\mathrm{e}^x)' = \frac{\mathrm{e}^x}{1+\mathrm{e}^{2x}}. \qquad \blacksquare$$

7.(2) 解. 计算可得

$$y' = \left(\left(1-x^2\right)^{-\frac{1}{2}}\right)' = -\frac{1}{2}\left(1-x^2\right)^{-\frac{3}{2}}(1-x^2)' = -\frac{1}{2}\left(1-x^2\right)^{-\frac{3}{2}} \cdot (-2x) = x\left(1-x^2\right)^{-\frac{3}{2}}. \qquad \blacksquare$$

7.(7) 解. 计算可得

$$y' = \frac{1}{\sqrt{1-\left(\sqrt{x}\right)^2}}\left(\sqrt{x}\right)' = \frac{1}{\sqrt{1-x}} \cdot \frac{1}{2\sqrt{x}} = \frac{1}{2\sqrt{x(1-x)}}. \qquad \blacksquare$$