

① $\cos \phi = \boxed{7/25}$ ($0^\circ < \phi < 90^\circ$)

$$\begin{aligned} \sqrt{1 - \cos^2 \phi} &= \sqrt{1 - (7/25)^2} \\ &= \sqrt{1 - 49/625} \\ &= \sqrt{\frac{576}{625}} \\ &= \boxed{24/25} \end{aligned}$$

a) $\sin 2\phi$
 $2 \sin \phi \cos \phi$
 $2 \cdot 7/25 \cdot 24/25$
 $\boxed{336/625}$

b) $\cos 2\phi$
 $\cos^2 \phi - \sin^2 \phi$
 $(7/25)^2 - (24/25)^2$
 $49/625 - 576/625$
 $\boxed{-527/625}$

c) $\tan 2\phi$
 $\frac{\sin 2\phi}{\cos 2\phi} = \frac{336/625}{-527/625}$
 $\boxed{\frac{336}{-527}}$

② $\cos \phi = 3/5$

$$\begin{aligned} \sqrt{1 - \cos^2 \phi} &= \sqrt{1 - (3/5)^2} \\ &= \sqrt{1 - 9/25} \\ &= \sqrt{16/25} = \boxed{4/5} \end{aligned}$$

a) $\sin 2\phi$
 $2 \cdot 4/5 \cdot 3/5$
 $\boxed{24/25}$

b) $\cos 2\phi$
 $(3/5)^2 - (4/5)^2$
 $9/25 - 16/25$
 $\boxed{-7/25}$

c) $\tan 2\phi$
 $\frac{24/25}{-7/25}$
 $\boxed{\frac{24}{-7}}$

④ $\cot s = 2$ ($\pi < s < 3\pi/2$)

$$\begin{aligned} -\sqrt{1 + (2)^2} &= -\sqrt{1 + 4} = -\sqrt{5} \\ \sin s &= \boxed{-1/\sqrt{5}} \\ -\sqrt{1 - (-1/\sqrt{5})^2} &= -\sqrt{4/5} = \boxed{-2/\sqrt{5}} = \cos s \end{aligned}$$

a) $\sin 2s$
 $2 \cdot (-1/\sqrt{5}) \cdot (-2/\sqrt{5}) = \boxed{4/5}$

b) $\cos 2s$
 $(-2/\sqrt{5})^2 - (-1/\sqrt{5})^2$
 $4/5 - 1/5 = \boxed{3/5}$

c) $\frac{4/5}{3/5} = \boxed{4/3}$

