

$$3. f(x) = \frac{x+2}{x-5} \quad p' = 1 \quad q' = 1$$

$$\begin{aligned} \textcircled{1} \quad \frac{p'q - pq'}{q^2} \\ f'(x) &= \frac{1(x-5) - (x+2)1}{(x-5)^2} \\ &= \frac{x-5-x-2}{(x-5)^2} \\ &= \frac{-7}{(x-5)^2} \end{aligned}$$

$$\textcircled{2} \quad -7 \neq 0 \quad \begin{aligned} (x-5)^2 &= 0 \\ x-5 &= 0 \\ \boxed{x=5} \end{aligned}$$

$$4. f(x) = \sin x + \cos^2 x \quad 0 < x < 2\pi$$

$$= \sin x + (\cos x)^2$$

$$\begin{aligned} \textcircled{1} \quad f'(x) &= \cos x + 2(\cos x)' \cdot \frac{d}{dx}(\cos x) \\ &= \cos x + 2\cos x(-\sin x) \\ &= \cos x - 2\cos x \sin x \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad \cos x - 2\cos x \sin x &= 0 \\ \cos x (1 - 2\sin x) &= 0 \end{aligned}$$

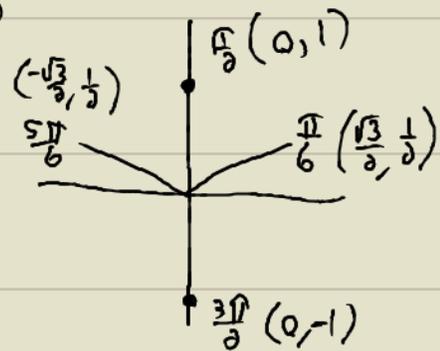
$$\cos x = 0 \quad | \quad 1 - 2\sin x = 0$$

$$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}}$$

$$1 = 2\sin x$$

$$\frac{1}{2} = \sin x$$

$$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$$



$$5. f(x) = \underbrace{x^2}_p \underbrace{e^{3x}}_q$$

$$\begin{aligned} \textcircled{1} \quad p' &= 2x \quad q' = e^{3x} \cdot \frac{d}{dx}(3x) \\ & \quad \quad \quad q' = 3e^{3x} \end{aligned}$$

$$p'q + pq'$$

$$\begin{aligned} f'(x) &= 2x e^{3x} + x^2 \cdot 3e^{3x} \\ &= e^{3x} x (2 + 3x) \end{aligned}$$

$$\textcircled{2} \quad e^{3x} x (2 + 3x) = 0$$

$$\begin{aligned} e^{3x} &= 0 \quad \boxed{x=0} \quad 2 + 3x = 0 \\ \cancel{2 + 3x} &= 0 \quad 3x = -2 \\ & \quad \quad \quad \boxed{x = -\frac{2}{3}} \end{aligned}$$