3. $f(X) = \dfrac{X+2}{X-5}$ $\begin{array}{l}) P \quad P' = 1 \\ ) Q \quad Q' = 1 \end{array}$

(1) $\dfrac{P'Q - PQ'}{Q^2}$

$$f'(X) = \frac{1(X-5) - (X+2)1}{(X-5)^2}$$

$$= \frac{X-5-X-2}{(X-5)^2}$$

$$= \frac{-7}{(X-5)^2}$$

(2) $\cancel{-7=0}$ $\qquad (X-5)^2 = 0$

$X - 5 = 0$

$X = 5$

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

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

(1) $f'(X) = \cos X + 2(\cos X)^1 \cdot \frac{d}{dx}(\cos X)$

$= \cos X + 2\cos X(-\sin X)$

$= \cos X - 2\cos X \sin X$

(2) $\cos X - 2\cos X \sin X = 0$

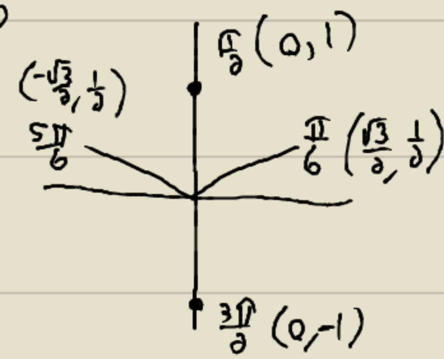
$\cos X(1 - 2\sin X) = 0$

$\cos X = 0 \qquad 1 - 2\sin X = 0$

$X = \frac{\pi}{2}, \frac{3\pi}{2}$ $\qquad 1 = 2\sin X$

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

$X = \frac{\pi}{6}, \frac{5\pi}{6}$



5. $f(X) = \underbrace{X^2}_{P}\,\underbrace{e^{3X}}_{Q}$

(1) $P' = 2X \quad Q' = e^{3X} \cdot \frac{d}{dx}(3X)$

$Q' = 3e^{3X}$

$P'Q + PQ'$

$f'(X) = 2Xe^{3X} + X^2 \cdot 3e^{3X}$

$= e^{3X}X(2 + 3X)$

(2) $e^{3X}X(2 + 3X) = 0$

$e^{3X} = 0 \qquad X = 0 \qquad 2 + 3X = 0$

$\cancel{\ln e^{3X} = \ln 0}$

$3X = -2$

$X = \frac{-2}{3}$