9. $f(x) = \underbrace{(5+3x)}_{P}\underbrace{e^{-4x}}_{Q}$

$P' = 3 \qquad Q' = e^{-4x} \cdot \frac{d}{dx}(-4x)$

$= e^{-4x} \cdot (-4)$

$Q' = -4e^{-4x}$

$P'Q + PQ'$

$f'(x) = 3e^{-4x} + (5+3x)\cdot(-4e^{-4x})$

$= e^{-4x}\left[3 + (5+3x)(-4)\right]$

$= e^{-4x}(3 - 20 - 12x)$

$= e^{-4x}(-12x - 17)$

$f'(x) = \underbrace{-e^{-4x}}_{P}\underbrace{(12x+17)}_{Q}$

$P' = -e^{-4x} \cdot \frac{d}{dx}(-4x) \qquad Q' = 12$

$= -(-4)e^{-4x}$

$P' = 4e^{-4x}$

$P'Q + PQ'$

$f''(x) = 4e^{-4x}(12x+17) + (-e^{-4x})(12)$

$= 4e^{-4x}\left[12x + 17 - 3\right]$

$= 4e^{-4x}(12x + 14)$

$= 4 \cdot 2e^{-4x}(6x+7)$

$= \boxed{8e^{-4x}(6x+7)}$