

(1) [7 points] Solve for x :

$$e^{x^2} = e^{3x} \cdot \frac{1}{e^2}$$

(2) [4 points] Determine the domain of $f(x) = 3 - 2 \log_4 \left[\frac{x}{2} - 5 \right]$.

(3) [4 points] Solve for x :

$$\log_3 (x^2 + 1) = 2$$