Quiz 3

Instructions: Show your work and explain every step.

(1) (4 points) Prove by a counterexamples that the following function is not onto:

$$g : \mathbb{R} \longrightarrow \mathbb{R},\ g(x) = e^{x^2}.$$

(2) (4 points) Prove by a counterexamples that the following function is not one-to-one:

$$f : \mathbb{R} \longrightarrow \mathbb{R},\ f(x) = e^{(x-3)^2}.$$

(3) (5 points) Find the inverse of the following function:

$$h : \mathbb{R} \longrightarrow (0, \infty),\ h(x) = e^{x-2}.$$

(4) (3 points) Let $f : \mathbb{R} \longrightarrow \mathbb{R},\ f(x) = x - 3$ and let g be the function in Question (1). Find $g \circ f$ if it's defined.

(5) (4 points) Determine if the following sets are countable or not. Explain.

(a) $5\mathbb{N}$.

(b) $\{\frac{1}{2n} \mid n \in \mathbb{N}\}$.

(c) $(3, 8)$.

(d) $(3, \infty)$.