Computability and Complexity
Assignment 2

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1 Question 1

Part a) Yes, the two functions are polynomially related. They are linked by the polynomial p(n) = n^2.
Proof:

$e^n \leq (e^n)^2$
$f(n) \leq p(g(n))$

$g(n) = (e^{n^2}) = (e^n)^2 = p(f(n))$

Part b) No, the two functions are not polynomially related.
Proof:
Assume that p(n) = n^a
We need to prove that: $g(n) = (e^{n^2}) \leq p(f(n))(=)e^{a \cdot n}$
If $x > a => g(x) = (e^{x^2}) \geq e^{a \cdot x} = p(f(x))$
Therefore, this does not work.