Problems

LO1. Answer the following.

(a) Provide the definition of what it means to be a mapping reduction from decision problem A to decision problem B. a) See lecture notes

(b) In relation to your answer to part a, if $f(n)$ is a valid mapping reduction from the Even decision problem to the Odd decision problem, then, if n is odd, then what must be true about $f(n)$? Explain.

(c) Is $f(n) = 7 - n$ a valid mapping reduction from the Even decision problem to the Odd decision problem? Justify your answer. Hint: if f is invalid, then a single input can be used to demonstrate invalidity. If f is valid, then provide a general reason (specific to f) for why it is valid.

b) Since n is odd it is a negative instance of Even and so f(n) must be a negative instance for Odd, i.e., it must be even.

c) 7 - n is odd when n is even since odd - even = odd and 7 - n is even when n is odd since odd - odd = even

∴ f(n) is valid, since it maps positive (resp. negative) instances of Even to positive (resp. negative) instances of odd.

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