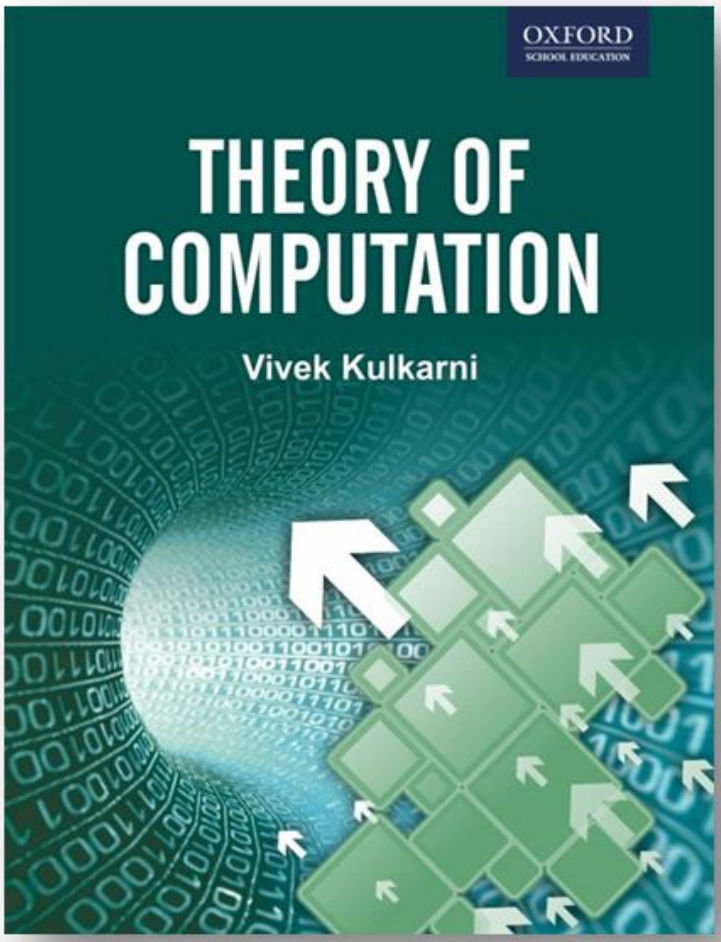

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Chapter-9: Undecidability

Solutions for Review Questions

Q.1 Write a short note on Rice's theorem.

Solution:

Refer to the section 9.7.

Q.2 What are the different properties of recursive and recursively enumerable languages?

Solution:

Refer to the section 9.2.1.

Q.3 Write short a note on Hilbert's tenth problem.

Solution:

Refer to the section 9.11.

Q.4 What is diagonalization? Use diagonalization to show that the halting problem is unsolvable.

Solution:

Refer to the section 9.4.1.

Q.5 Show that if L is a recursive language, then $\bar{L}$ is also a recursive language.

Solution:

Refer to the section 9.2.1, theorem 9.1.

Q.6 Show that the diagonalization language L_d is not recursively enumerable.

Solution:

Refer to the section 9.4.2.

Q.7 Prove that if a language L and its complement $\bar{L}$ are recursively enumerable, then L is a recursive language.

Solution:

Refer to the section 9.2.1, theorem 9.2.

Q.8 State the undecidable problems for TMs.

Solution:

Refer to the section 9.6.

Q.9 State how Greibach's theorem can be used to prove that many problems related to CFGs are undecidable. List a few undecidable problems for CFGs.

Solution:

Refer to the section 9.10.

Q.10 What is Ackermann's function? State its significance.

Solution:

Refer to the section 9.12.

Q.11 Show that Post's correspondence problem is undecidable.

Solution:

Refer to the section 9.8.

Q.12 Write a short note on Gödel numbering.

Solution:

Refer to the section 9.3.

