

# Machines That Do Math and the Scope of Software Patents

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## ABSTRACT

To the current debate over the patent-eligibility of software-implemented inventions, this paper contributes an analysis explicitly and purposely grounded in what Judge Rader dismissively referred to as “the age of iron and steel at a time of subatomic particles and terabytes.”

Specifically, I show that certain mechanical inventions — in technologies ranging from steam engines to robots — can be (and sometimes are) claimed in such abstract terms that the grant of a patent would preempt all practical uses of a geometric theorem and inhibit progress in pure mathematics. Since the courts have frequently cited the Pythagorean Theorem as an example of an unpatentable fundamental principle, the preemption concerns expressed in software patentability opinions from *Benson* to *Bilski* apply with equal force in the mechanical arts.

Historically, the vast majority of mechanical patent claims have been drawn to specific machines. As a result, challenges to the eligibility of their claimed subject matter have been rare, and there is little caselaw to delineate the boundary in the mechanical arts between a patentable machine and an unpatentable abstract idea.

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Further doctrinal development on the patent-eligibility of mechanical inventions would illuminate the current software patent debate. In particular, *when should a software patent claim's recitation of a machine (i.e., a computer) be deemed so abstract that it fails to "impose meaningful limits on the claim's scope"?*

In software patent doctrine, the concept of a general-purpose computer is broad: in addition to today's transistor-based digital computers, it may include past (Babbage's difference engine) and emerging (Blick and Marsland's nanomechanical computer) technologies in the mechanical arts. Since software inventions will not necessarily coincide with transitions between hardware technologies, a stable doctrine for the patent-eligibility of software inventions should treat abstract-machine limitations similarly regardless of whether the general-purpose computers contemporaneously in use are predominantly transistor-based or mechanical.

I propose the following test: *A machine recited in a patent claim is an abstract idea, and fails to impart patent-eligibility, if the claim (as properly construed) fails to address, and therefore imposes no limitation on, any resources the machine may consume in performing its work according to the claim.*

This test is consistent with (and inspired by) the mathematical preemption concerns that apply to mechanical inventions in general, as well as novelty and enablement concerns identified in my earlier work on computational complexity and the scope of software patents. It also encapsulates widely accepted characterizations of the scope of the technological arts, including the microeconomic understanding of technological innovation as the advancement of a production possibility frontier, and Prof. Thomas's description of technology as "knowledge that is applied toward material enterprise, guided by an orientation to the external environment and the necessity of design."