

### Problem 332C

A rocket engine is designed to operate at a pressure ratio (inlet reservoir pressure/ exit pressure) of 31. Find:

1. The ratio of the exit area to the throat area which is necessary for the supersonic exhaust to be correctly expanded.
2. The Mach number of the exit flow under correctly expanded conditions.
3. The lowest pressure ratio at which the same nozzle would be choked.
4. The pressure ratio at which there would be a normal shock wave at the exit.

Assume that the gas behaves isentropically (except across a shock if one is present) and that the ratio of specific heats of the gas is 1.4.