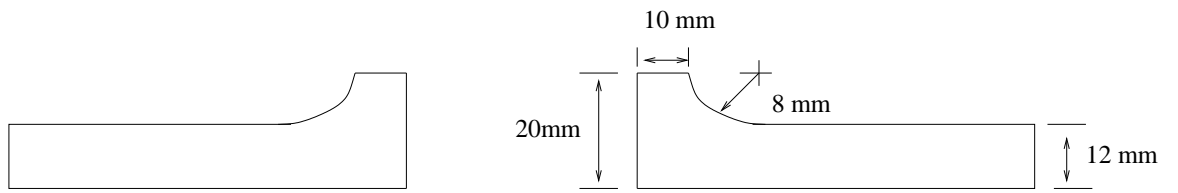
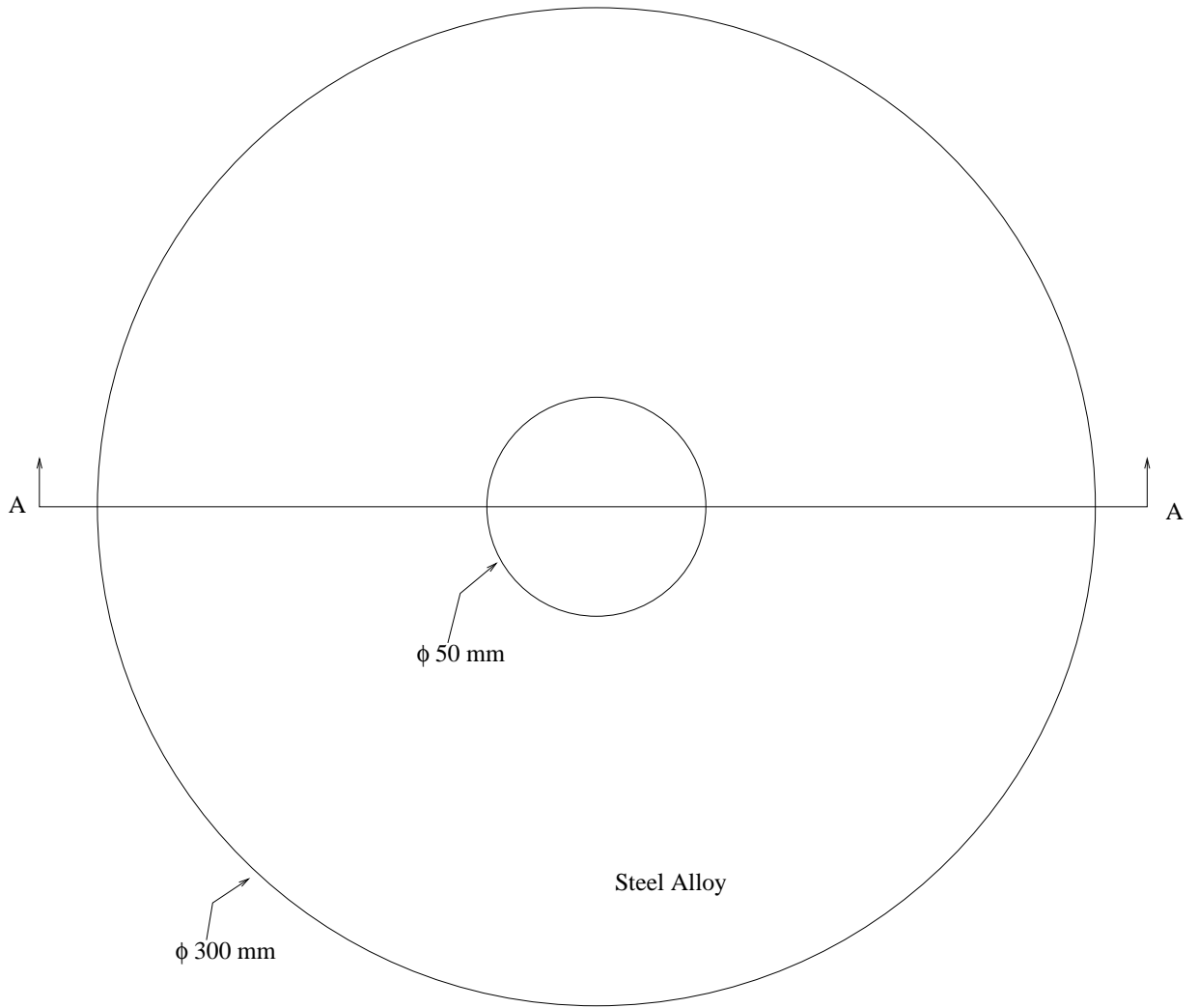


HW 7: Due 4/2/04

1. Book Problem Chapter 6, Problem 23
2. Book Problem Chapter 6, Problem 24
3. Disc brakes are quite common in today's cars. A picture of one even appears on the cover of our text book. The way they work is as follows. A metal disk (sometimes solid, sometimes hollow, etc.) is bolted to the wheel and turns freely with wheel under normal circumstances. When you wish to brake, a caliper forces two brake pads to clamp the rotating disc which then stops the wheel from spinning. Below is a rough diagram of one of the front discs on my 1984 BMW 318i; they are solid.
 - (a) Find the first fundamental mode of vibration of the disc.
 - (b) Note, hitting the first fundamental is a bad thing while driving, how fast would I have to be driving to hit this vibrational instability. Note the car has P195/60-R14 tires.
 - (c) If I wanted to use such a rotor on a car to be driven up to 160 miles per hour, how would you re-design the rotor.

Note there is purposely some information missing from the problem statement. Use your best engineering judgement and a little simple research to fill in what you do not know or what is not given in the statement.



Section A - A
[Not to scale]