

## CO523 QUIZ 3

Answer all parts in a single file named `cad.ml`.

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1. A CAD program needs to represent the following solids.

**Spheres** represented by the centre  $(x, y, z)$  and radius  $r$ .

**Cylinders** represented by the ends of the central axis  $(x_1, y_1, z_1)$  and  $(x_2, y_2, z_2)$  and, radius  $r$ .

**Cubes** represented by the two opposite ends  $(x_1, y_1, z_1)$  and  $(x_2, y_2, z_2)$ .

- (a) Declare a type `solid` capable of representing any of these solids.
- (b) Write a function `volume` that calculates the volume of a solid using the following formulae.

**Spheres**  $\frac{4}{3}\pi r^3$

**Cylinders**  $\pi r^2 h$  where  $h = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$

**Cubes**  $d^3$  where,  $d = |x_1 - x_2|$ .