

2. (a) On the same diagram, sketch  $y = x$  and  $y = \sqrt{x}$ , for  $x \geq 0$ , and mark clearly the coordinates of the points of intersection of the two graphs. (2)

- (b) With reference to your sketch, explain why there exists a value  $a$  of  $x$  ( $a > 1$ ) such that

$$\int_0^a x \, dx = \int_0^a \sqrt{x} \, dx.$$

(2)

- (c) Find the exact value of  $a$ .

(4)

- (d) Hence, or otherwise, find a non-constant function  $f(x)$  and a constant  $b$  ( $b \neq 0$ ) such that

$$\int_{-b}^b f(x) \, dx = \int_{-b}^b \sqrt{|f(x)|} \, dx.$$

(2)