

10 (a) Given that

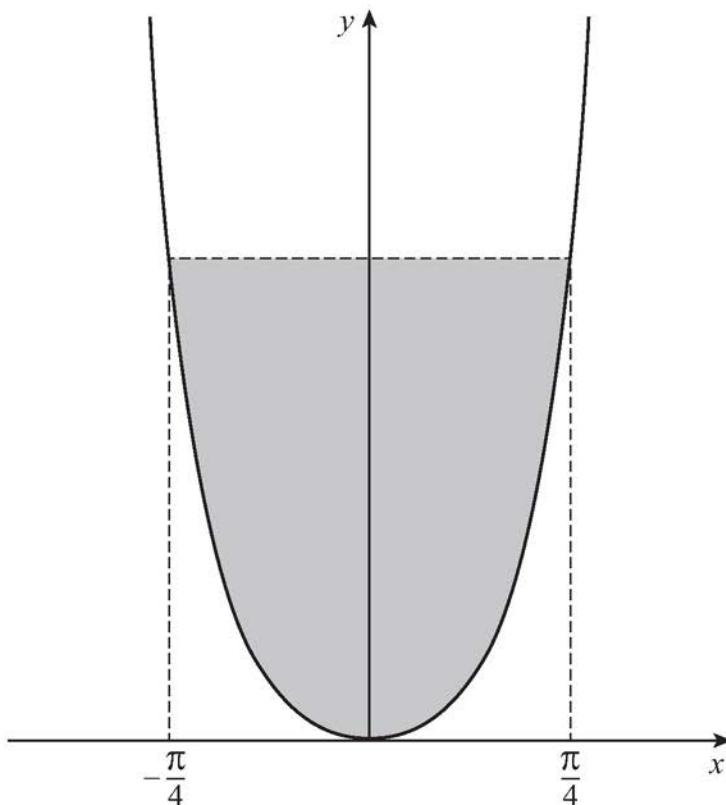
$$y = \tan x$$

use the quotient rule to show that

$$\frac{dy}{dx} = \sec^2 x$$

[3 marks]

10 (b) The region enclosed by the curve $y = \tan^2 x$ and the horizontal line, which intersects the curve at $x = -\frac{\pi}{4}$ and $x = \frac{\pi}{4}$, is shaded in the diagram below.



Show that the area of the shaded region is

$$\pi - 2$$

Fully justify your answer.

[5 marks]