

## STEP II, 2015, Q4

- 4 (i) The continuous function  $f$  is defined by

$$\tan f(x) = x \quad (-\infty < x < \infty)$$

and  $f(0) = \pi$ . Sketch the curve  $y = f(x)$ .

- (ii) The continuous function  $g$  is defined by

$$\tan g(x) = \frac{x}{1+x^2} \quad (-\infty < x < \infty)$$

and  $g(0) = \pi$ . Sketch the curves  $y = \frac{x}{1+x^2}$  and  $y = g(x)$ .

- (iii) The continuous function  $h$  is defined by  $h(0) = \pi$  and

$$\tan h(x) = \frac{x}{1-x^2} \quad (x \neq \pm 1).$$

(The values of  $h(x)$  at  $x = \pm 1$  are such that  $h(x)$  is continuous at these points.) Sketch the curves  $y = \frac{x}{1-x^2}$  and  $y = h(x)$ .



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