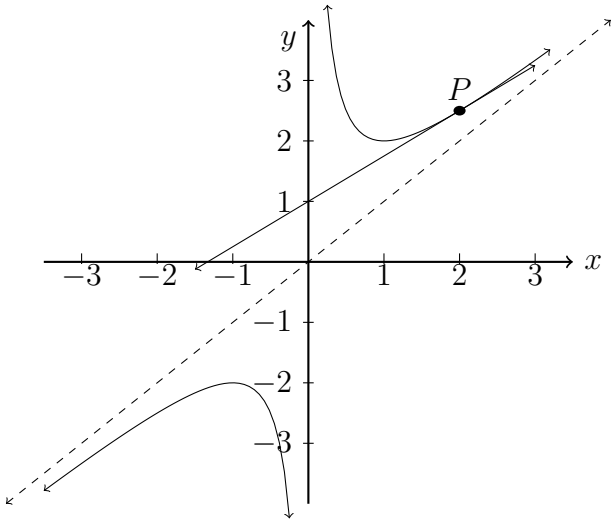
6.10 Do Now : Tangents, systems of equations, use of sine function
Calculator practice H

1. The reciprocal function $f(x) = \dfrac{1}{x} + x$ is shown on the axes below.



A tangent to the function at $x = 2$ is drawn with the point of tangency P.

(a) Write down the derivative of f, $f'(x)$. (hint: use a negative exponent) [2]

(b) Show that the gradient of the tangent line is $\frac{3}{4}$. [1]

(c) Find the equation of the tangent line. [2]

(d) Show that there is a local minimum at $x = 1$. (hint: show the derivative is zero at $x = 1$. Sketch where the function is decreasing then increasing.) [2]

Working:

Answers:

(a) .....

(c) .....

(d) .....

(e)(i) .....

(ii) .....

2. The function $f(x) = x \sin x$ is tangent to the line $y = x$ once in each period. Find the coordinates of the first two points of tangency, i.e. for $x > 0$.

   Sketch the graph to show working.
   (note: when a degree measure is used in a function, assume it is in radians.)

Working:

Answers:

(a) .....

(b) .....

3. Given a triangle $\triangle ABC$ with $a = 11.3$, $b = 15.6$, $\hat{C} = 58°$.

   (a) Find the third side length, c. [3]

   (b) Find the area of the triangle $\triangle ABC$. [3]

Working:

Answers:

(a) .....

(b) .....