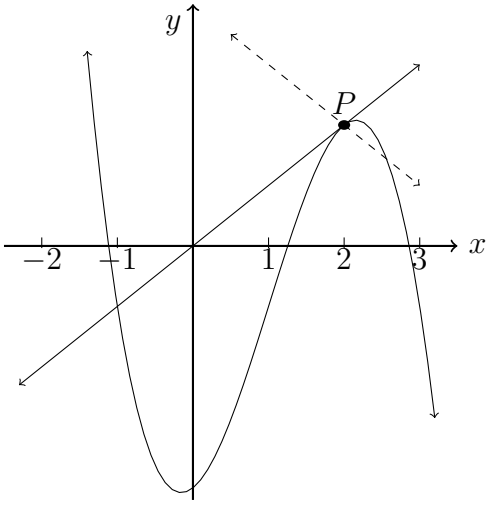
6.9 Do Now Quiz: Tangents, systems of equations, law of cosines
Calculator practice H

1. A cubic function $f(x) = -x^3 + 3x^2 + x - 4$ 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 the function, $f'(x)$. [2]

(b) Show that the gradient of the tangent line is 1. [1]

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

(d) Write down the slope of the perpendicular to the tangent line (the "normal") [1]

(e) Find the x values of

i. the local minimum and

ii. the local maximum of f. [2]

Working:

Answers:

(a) .....

(c) .....

(d) .....

(e)(i) .....

(ii) .....

2. The function $\sin 2x$ equals $-\frac{\sqrt{2}}{2}$ twice in each period. Set your calculator for radians, and find the solutions for the system (x such that $f(x) = g(x)$) over the domain $0 \leq x \leq \pi$. Sketch the graph to show working.

$f(x) = \sin 2x$ $\qquad$ $g(x) = -\dfrac{\sqrt{2}}{2}$ [2]

Working:

Answers:

(a) .....

(b) .....

3. Apply the law of cosines, $c^2 = a^2 + b^2 - 2ab\cos C$; $\cos C = \dfrac{a^2 + b^2 - c^2}{2ab}$.

(a) $a = 12.3$, $b = 14.6$, $\hat{C} = 62°$. Find the third side length, c. [3]

(b) $a = 15.4$, $b = 11.1$, $c = 10.1$. Find $\hat{C}$ (the angle opposite side c). [3]

Working:

Answers:

(a) .....

(b) .....