200 Exam Questions & Answers

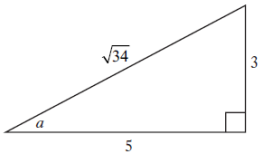
181
Show that $(3x + 1)$ is a factor of $g(x) = 3x^3 + 4x^2 - 5x - 2$.
Hence fully factorise $g(x)$.

182
Solve $1 - 2x - 3x^2 > 0$, where x is a real number.

183
Solve the equation $log_2(x + 1) - 2log_2 3 = 3$.

184
Solve $2tan3x + 2 = 0$ for $0 \leq x \leq 360$.

185
A right-angled triangle has sides and angles as shown in the diagram. What is the value of $sin2a$?



186
Given that $y = \sin(x^2 - 3)$, find $\frac{dy}{dx}$.

187
A curve has equation $y = 3x^2 - x^3$. Find the coordinates of the stationary points on this curve and determine their nature.

188
Find $\int (2x + 9)^5 \, dx$

189
Find $\int_0^2 \sqrt{4x + 1} \, dx$.

190
Express $f(x) = \sqrt{3}cosx + sinx$ in the form $ksin(x + a)$, where $k > 0$ and $0 < a < \frac{\pi}{2}$.

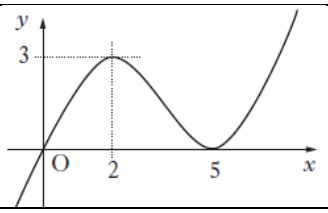
191

A function f, defined on a suitable domain, is given by $f(x) = \frac{6x}{x^2+6x-16}$.

What restrictions are there on the domain of f?

192

The diagram shows part of the graph of $y = f(x)$. Sketch the graph of $y = 2f(x) + 1$



193

$\boldsymbol{p} = -\boldsymbol{i} + 3\boldsymbol{j} + 4\boldsymbol{k}$ and $\boldsymbol{q} = 7\boldsymbol{i} - \boldsymbol{j} + 5\boldsymbol{k}$

a) Express $\overrightarrow{PQ}$ in component form.

b) Find the length of PQ.

194

The vectors $\boldsymbol{u} = \begin{pmatrix} 1 \\ k \\ k \end{pmatrix}$ and $\boldsymbol{v} = \begin{pmatrix} -6 \\ 2 \\ 5 \end{pmatrix}$ are perpendicular.

What is the value of k?

195

Show that:

$(1 + 2sinx)(1 - 2sinx) = 4cos^2x - 3$

196

Find the equation of the line through the point (-1, 4) which is parallel to the line with equation $3x - y + 2 = 0$.

197

A triangle has vertices P(-2, 2), Q(6, 6) and R(6, -4)

Find the equation of the perpendicular bisector of PR.

198

Find P and Q, the points of intersection of the line $y = 3x - 5$ and the circle C_1 with equation $x^2 + y^2 + 2x - 4y - 15 = 0$.

199

A sequence is defined by the recurrence relation $u_{n+1} = \frac{1}{4}u_n + 16,\ u_0 = 0$.

Calculate the values of $u_1, u_2, \text{and } u_3$.

200

Calculate the shaded area between the curve $y = -x^2 + 7x - 10$ and the *x*-axis.