HIGHER QUICKIES 4

What is the derivative of $\frac{6x^3 - 1}{3x}$ with respect to x?

$\boldsymbol{u}$ and $\boldsymbol{v}$ are vectors with components $\begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ -1 \\ 0 \end{pmatrix}$ respectively.

If $t°$ is the angle between $\boldsymbol{u}$ and $\boldsymbol{v}$, what is the value of $\cos t°$?

A curve has equation $y = 3x^2 - 7x - 2$.

What is the gradient of the tangent at the point where $x = 3$?

A circle with centre $(-1, 5)$ passes through the point $(2, 1)$.

What is the equation of the circle?

$3x^2 + 6x - 10$ is expressed in the form $3(x + p)^2 + q$.

What is the value of q?

A sequence is defined by the recurrence relation $u_{n+1} = au_n + 3$ with $u_0 = 5$.

Find an expression, in terms of a, for u_2.

The point P(3, 1) lies on the circle with equation $(x - 2)^2 + (y - 3)^2 = 5$.

What is the gradient of the tangent at P?

A sequence is generated by the recurrence relation $u_{n+1} = 0{\cdot}6u_n + 5$.

What is the limit of this sequence as $n \to \infty$?

Find $\int 3\cos 4x\,dx$.

Functions f and g are given by $f(x) = 3x^2 - 1$ and $g(x) = x^2 + 2$.

Find an expression for $f(g(x))$.

SOLUTIONS			
1. $4x + \frac{1}{3x^2}$	2. $\frac{\sqrt{6}}{3}$	3. $m = 11$	4. $(x+1)^2 + (y-5)^2 = 25$
5. Q = -13	6. $5a^2 + 3a + 3$	7. m = $\frac{1}{2}$	8. $\frac{50}{4}$
9. $-\frac{3}{4}\sin 4x + C$	10. $3(x^2 + 2)^2 - 1$		