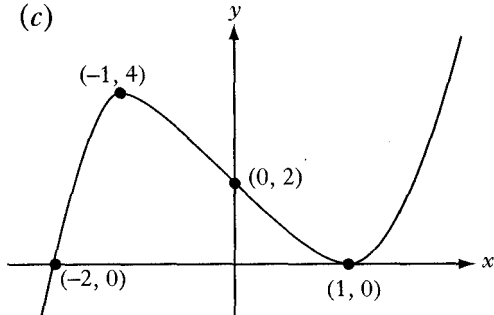
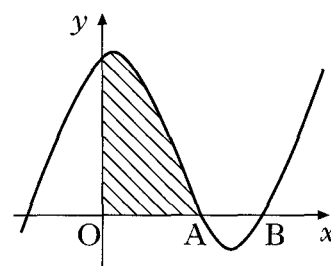
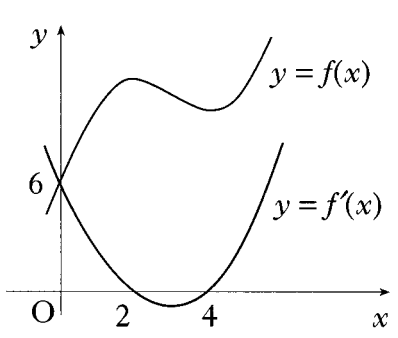
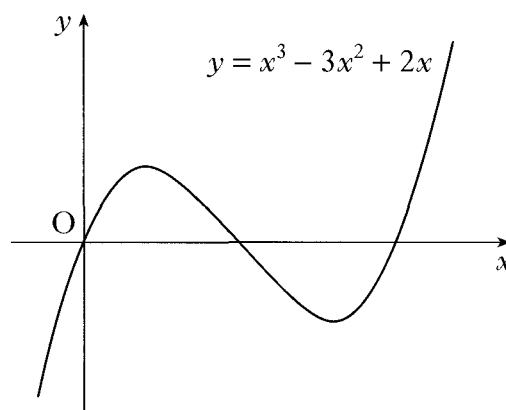


2008 P1	<p>21. A function f is defined on the set of real numbers by $f(x) = x^3 - 3x + 2$.</p> <p>(a) Find the coordinates of the stationary points on the curve $y = f(x)$ and determine their nature.</p> <p>(b) (i) Show that $(x - 1)$ is a factor of $x^3 - 3x + 2$. (ii) Hence or otherwise factorise $x^3 - 3x + 2$ fully.</p> <p>(c) State the coordinates of the points where the curve with equation $y = f(x)$ meets both the axes and hence sketch the curve.</p>	6 5 4
Ans	<p>(a) $(-1, 4)$ maximum $(1, 0)$ minimum</p> <p>(b) (i) $x = 1, f(x) = 0$ so $(x - 1)$ is a factor (ii) $(x - 1)(x - 1)(x + 2)$</p>	
2008 P1	<p>22. The diagram shows a sketch of the curve with equation $y = x^3 - 6x^2 + 8x$.</p> <p>(a) Find the coordinates of the points on the curve where the gradient of the tangent is -1.</p> <p>(b) The line $y = 4 - x$ is a tangent to this curve at a point A. Find the coordinates of A.</p>	5 2
Ans	(a) $(1, 3), (3, -3)$ (b) $(1, 3)$	
2007 P1	<p>8. The diagram shows a sketch of the graph of $y = x^3 - 4x^2 + x + 6$.</p> <p>(a) Show that the graph cuts the x-axis at $(3, 0)$.</p> <p>(b) Hence or otherwise find the coordinates of A.</p>	1 3



Ans	<p>(a) To cut the x-axis, $y = 0$. So $0 = x^3 - 4x^2 + x + 6$ $= (x - 3)(x^2 - x - 2)$ $= (x - 3)(x - 2)(x + 1)$ So graph cuts x-axis at $x = -1, 3, 2$.</p> <p>(b) (2,0)</p>		
2007 P2	<p>10. The diagram shows the graphs of a cubic function $y = f(x)$ and its derived function $y = f'(x)$.</p> <p>Both graphs pass through the point (0, 6).</p> <p>The graph of $y = f'(x)$ also passes through the points (2, 0) and (4, 0).</p> <p>(a) Given that $f'(x)$ is of the form $k(x - a)(x - b)$:</p> <p>(i) write down the values of a and b;</p> <p>(ii) find the value of k.</p>		3
Ans	<p>(a) (i) $a = 2, b = 4$</p> <p>(ii) $k = \frac{3}{4}$</p>		
2005 P1	<p>8. A function f is defined by the formula $f(x) = 2x^3 - 7x^2 + 9$ where x is a real number.</p> <p>(a) Show that $(x - 3)$ is a factor of $f(x)$, and hence factorise $f(x)$ fully.</p> <p>(b) Find the coordinates of the points where the curve with equation $y = f(x)$ crosses the x- and y-axes.</p> <p>(c) Find the greatest and least values of f in the interval $-2 \leq x \leq 2$.</p>	<p>5</p> <p>2</p> <p>5</p>	
Ans	<p>(a) $(x - 3)(2x - 3)(x + 1)$</p> <p>(b) $(-1, 0), (-\frac{3}{2}, 0), (3, 0)$</p> <p>(c) greatest value = 9 least value = -35</p>		
2005 P2	<p>11. (a) Show that $x = -1$ is a solution of the cubic equation $x^3 + px^2 + px + 1 = 0$.</p> <p>(b) Hence find the range of values of p for which all the roots of the cubic equation are real.</p>	<p>1</p> <p>7</p>	
Ans	<p>(a) $f(-1) = -1 + p - p + 1 = 0$</p> <p>(b) $p \leq -1, p \geq 3$</p>		

2004 P1	<p>2. $f(x) = x^3 - x^2 - 5x - 3$.</p> <p>(a) (i) Show that $(x + 1)$ is a factor of $f(x)$. (ii) Hence or otherwise factorise $f(x)$ fully.</p> <p>(b) One of the turning points of the graph of $y = f(x)$ lies on the x-axis. Write down the coordinates of this turning point.</p>	5 1
Ans	$(x + 1)(x + 1)(x - 3)$ $(-1, 0)$	
2003 P2	<p>1. $f(x) = 6x^3 - 5x^2 - 17x + 6$.</p> <p>(a) Show that $(x - 2)$ is a factor of $f(x)$. (b) Express $f(x)$ in its fully factorised form.</p>	4
Ans	<p>(b) $(x - 2)(2x + 3)(3x - 1)$</p>	
2002W P1	<p>5. Given that $(x - 2)$ and $(x + 3)$ are factors of $f(x)$ where $f(x) = 3x^3 + 2x^2 + cx + d$, find the values of c and d.</p>	5
Ans	$c = -19, d = 6$	
2001 P2	<p>1. (a) Given that $x + 2$ is a factor of $2x^3 + x^2 + kx + 2$, find the value of k. (b) Hence solve the equation $2x^3 + x^2 + kx + 2 = 0$ when k takes this value.</p>	3 2
Ans	<p>(a) $k = -5$ (b) $x = -2, \frac{1}{2}, 1$</p>	
2000 P2	<p>1. The diagram shows a sketch of the graph of $y = x^3 - 3x^2 + 2x$.</p> <p>(a) Find the equation of the tangent to this curve at the point where $x = 1$.</p> <p>(b) The tangent at the point $(2, 0)$ has equation $y = 2x - 4$. Find the coordinates of the point where this tangent meets the curve again.</p>	5 5
Ans	<p>(a) $x + y = 1$ (b) $(-1, -6)$</p>	



<i>Specimen 2 PI</i>	<p>1. Show that $x = 2$ is a root of the equation $y = 2x^3 + x^2 - 13x + 6 = 0$ and hence, or otherwise, find the other roots.</p>	4
<i>Ans</i>	$\begin{array}{r rrrr} 2 & 2 & 1 & -13 & 6 \\ & & 4 & 10 & -6 \\ \hline & 2 & 5 & -3 & 0 \end{array}$ <p>remainder = 0 $\Rightarrow x = 2$ is a root $2x^2 + 5x - 3 = 0 \Rightarrow x = \frac{1}{2}, -3$</p>	
<i>Specimen 1 PI</i>	<p>3. (a) Show that $(x - 1)$ is a factor of $f(x) = x^3 - 6x^2 + 9x - 4$ and find the other factors.</p> <p>(b) Write down the coordinates of the points at which the graph of $y = f(x)$ meets the axes.</p>	3 1
<i>Ans</i>	<p>(a) $f(1) = 0, (x - 4), (x - 1)$</p> <p>(b) $(1,0), (4,0), (0, -4)$</p>	