



1. Solve the equations  $x^3 + 4x^2 + 3x = 0$

(3)

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2. Sketch the following graph,  $f(x) = (x + 2)(x - 1)(x - 3)$

(3)

3. Sketch the following graph,  $f(x) = (3x - 1)(x + 2)(1 - x)$

(3)

4. Sketch the following graph,  $f(x) = (x + 1)(x - k)^2$

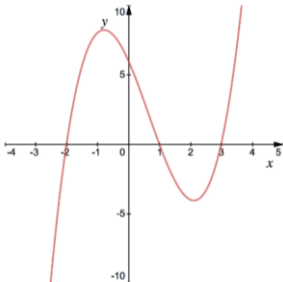
(3)

## Solutions

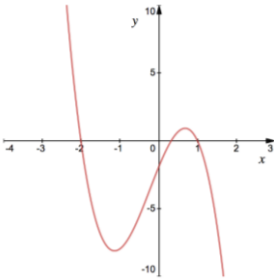
1.

$x(x^2 + 4x + 3) = x(x + 3)(x + 1)$	<b>M1</b>
$x = 0$	<b>M1</b>
$x = -3$ $x = -1$	<b>M1</b>

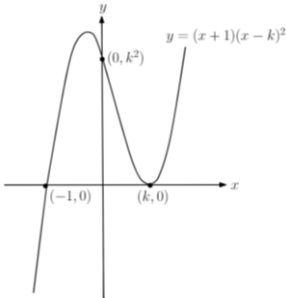
2.

$f(x) = (x + 2)(x - 1)(x - 3)$ $x = -2$ $x = 1$ $x = 3$	<b>M1</b>
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 40%;"> <p>Shape <b>M1</b> Roots marked <b>M1</b></p> </div> <div style="width: 55%; text-align: center;">  </div> </div>	

3.

$f(x) = (3x - 1)(x + 2)(1 - x)$ $x = \frac{1}{3}$ $x = -2$ $x = 1$	<b>M1</b>
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 40%;"> <p>Shape <b>M1</b> Roots marked <b>M1</b></p> </div> <div style="width: 55%; text-align: center;">  </div> </div>	

4.

$f(x) = (x + 1)(x - k)^2$ $x = -1$ $x = k$	<b>M1</b>
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 40%;"> <p>Shape <b>M1</b> Roots marked <b>M1</b></p> </div> <div style="width: 55%; text-align: center;">  </div> </div>	

