

- 
- 
- 
- 
- 
- 

- 
- 
- 
- 
- 
- 

[illegible]

## Solutions

1.

$f'(x) = 4x + 2$	<b>M1</b>
$4x + 2 \geq 0$	<b>M1</b>
$x \geq -\frac{1}{2}$	<b>M1</b>

2.

$f(x) = x(x - 6)^2$ $f(x) = x(x^2 - 12x + 36)$ $f(x) = x^3 - 12x^2 + 36x$	<b>M1</b>
$f'(x) = 3x^2 - 24x + 36$	<b>M1</b>
$3x^2 - 24x + 36 \leq 0$ $x^2 - 8x + 12 \leq 0$	<b>M1</b>
$(x - 6)(x - 2) \leq 0$ $2 \leq x \leq 6$	<b>M1</b>

3a.

As $(x + 1)$ is a factor, $f(-1) = 0$	<b>M1</b>
Therefore, $-1 + k + 3 = 0$ $k = -2$	<b>M1</b>

3b.

$f'(x) = 3x^2 - 4x$	<b>M1</b>
$3x^2 - 4x \geq 0$ $x(3x - 4) \geq 0$	<b>M1</b>
$x \leq 0$ and $x \geq \frac{4}{3}$	<b>M1</b>

