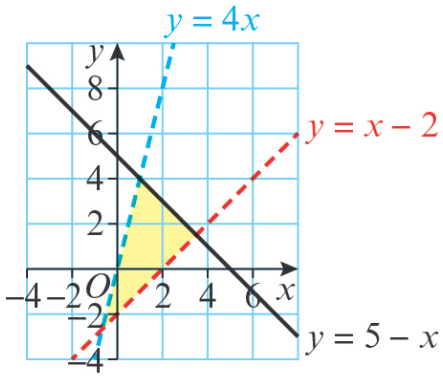
Equations and inequalities 3G

1



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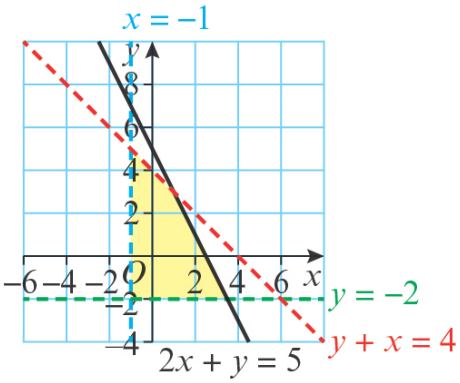

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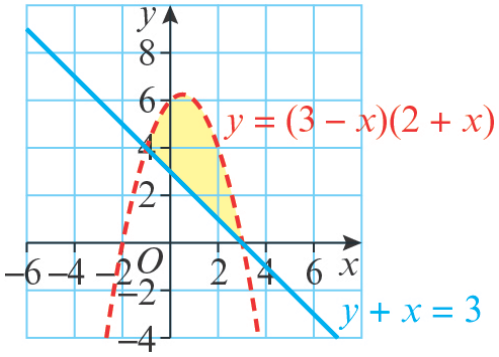

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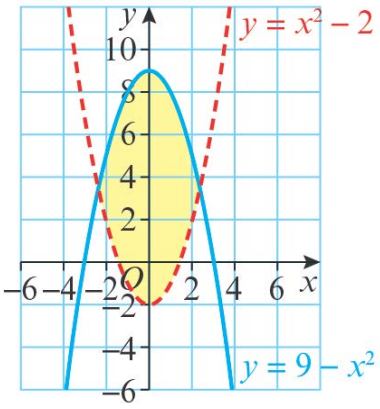

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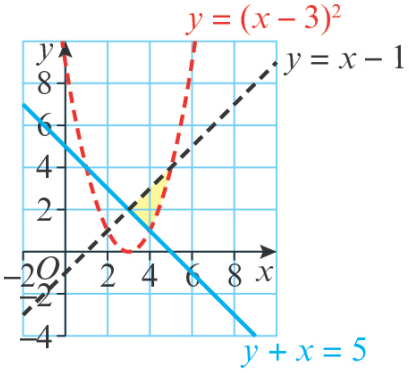

6 a For $y = x + 1$ and $y = 7 - x$:

$x + 1 = 7 - x$

$2x = 6$

$x = 3, y = 4$

For $y = 7 - x$ and $x = 1$:

$x = 1, y = 6$

For $x = 1$ and $y = x + 1$

$x = 1, y = 2$

The points of intersection are (3, 4), (1, 6) and (1, 2).

b $y \geq x + 1$, $y \leq 7 - x$ and $x \geq 1$

7 $y < 2 - 5x - x^2$, $2x + y \geq 0$ and $x + y \leq 4$

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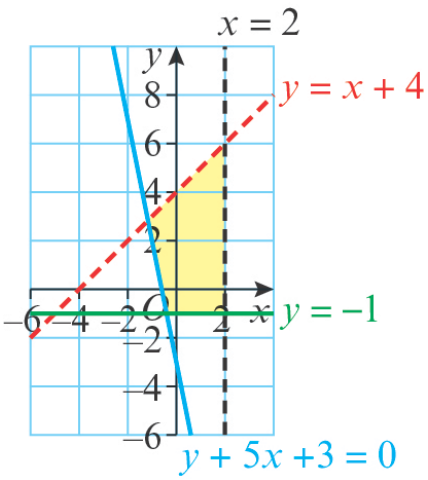
8 a



b For $y = x + 4$ and $y = -5x - 3$:
$x + 4 = -5x - 3$
$6x = -7$
$x = -\frac{7}{6}$, $y = \frac{17}{6}$
For $y = -5x - 3$ and $y = -1$:
$y = -1$, $x = -\frac{2}{5}$
For $y = -1$ and $x = 2$:
$x = 2$, $y = -1$
For $x = 2$ and $y = x + 4$:
$x = 2$, $y = 6$
The vertices are at the points
$(-\frac{7}{6}, \frac{17}{6})$, $(-\frac{2}{5}, -1)$, $(2, -1)$ and $(2, 6)$.

c $(-\frac{2}{5}, -1)$ is the only vertex formed by two solid lines.

d Area of shaded region = area of right-angled triangle − area of unshaded triangle
Area of right-angled triangle
$= \frac{1}{2} \times 7 \times 7$
$= \frac{49}{2}$
Area of unshaded triangle
$= \frac{1}{2} \times (-\frac{2}{5} - -5) \times (\frac{17}{6} - (-1))$
$= \frac{529}{60}$
Area of shaded region
$= \frac{49}{2} - \frac{529}{60}$
$= \frac{941}{60}$

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