Regions In The Plane

To draw a region, first you have to sketch the curve.

1) If $<$ or $>$ use a dotted line

2) If $\leq$ or $\geq$ use a solid line

3) Circle the point of intersection if it is NOT included (i.e. one is $<$ or $>$)

To calculate the region, test a point NOT on the curve.

e.g. (i) $y < x + 3$

test $(0,0)$

$0 < 3$ ✓
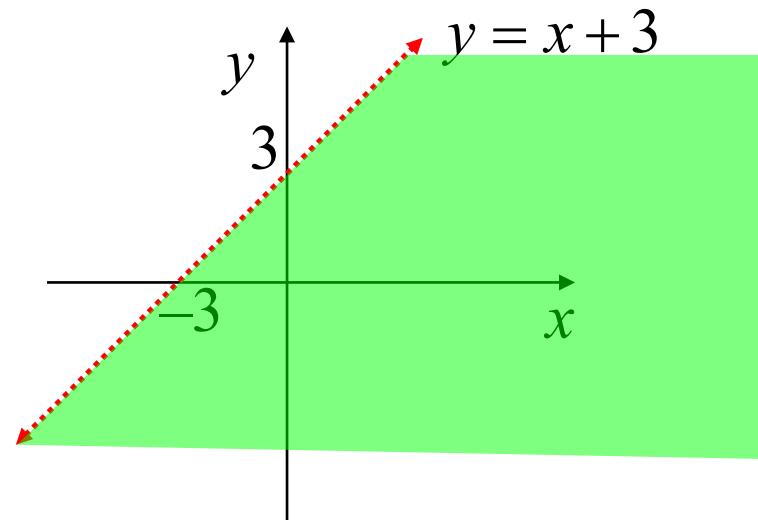
(ii) $x^2 + y^2 \geq 9$

test $(0,0)$

$0^2 + 0^2 \geq 9$

$0 \geq 9$ ✗

$x^2 + y^2 = 9$
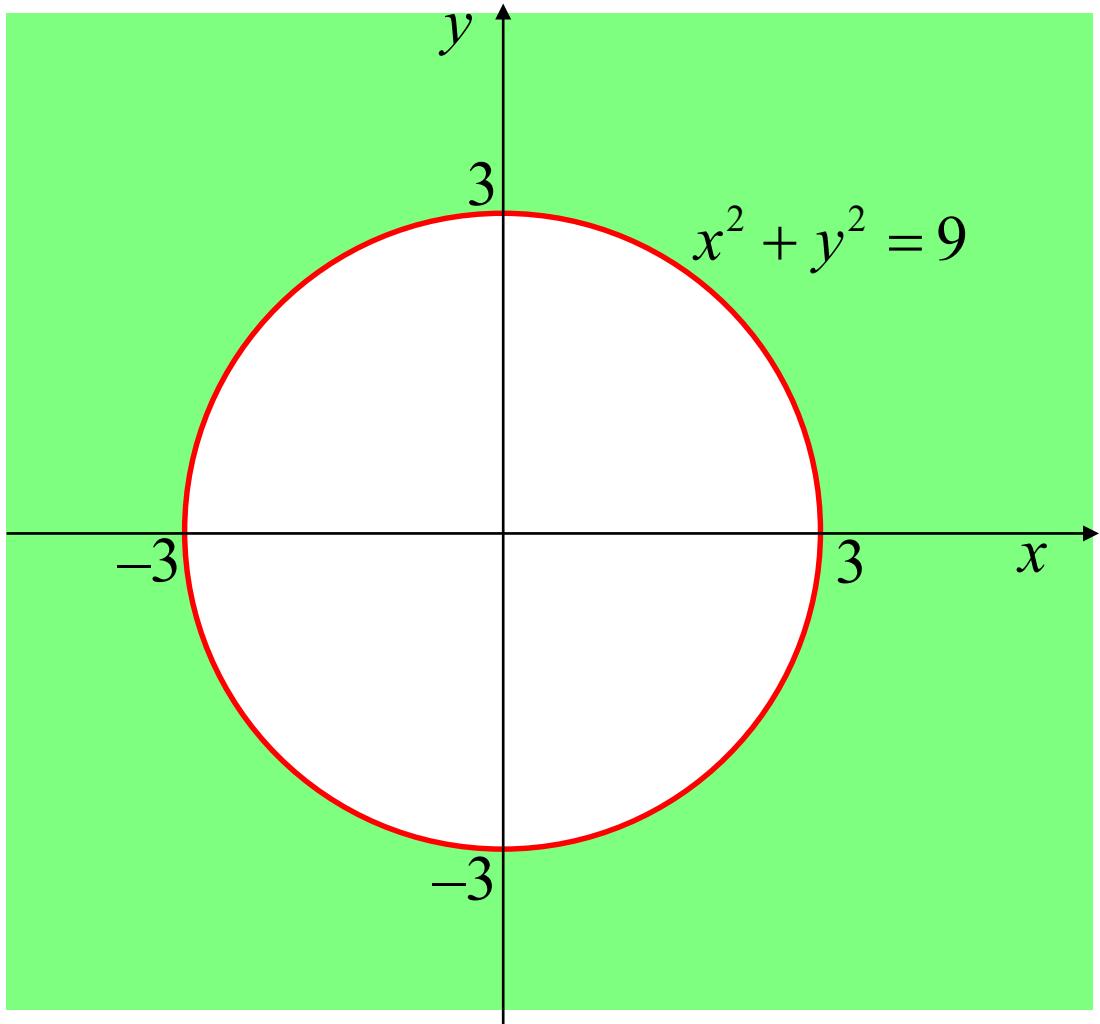
(ii) $y < \sqrt{4 - x^2}$

test $(0,0)$

$0 < \sqrt{4 - 0^2}$

$0 < 2$ $\checkmark$

$y = \sqrt{4 - x^2}$

(iv) $y \geq x^2$ and $y \leq 3x + 4$

$y \geq x^2$ $\qquad$ $y \leq 3x + 4$

test $(0,1)$ $\qquad$ test $(0,0)$

$0 \leq 1^2$ $\qquad$ $0 \leq 0 + 4$
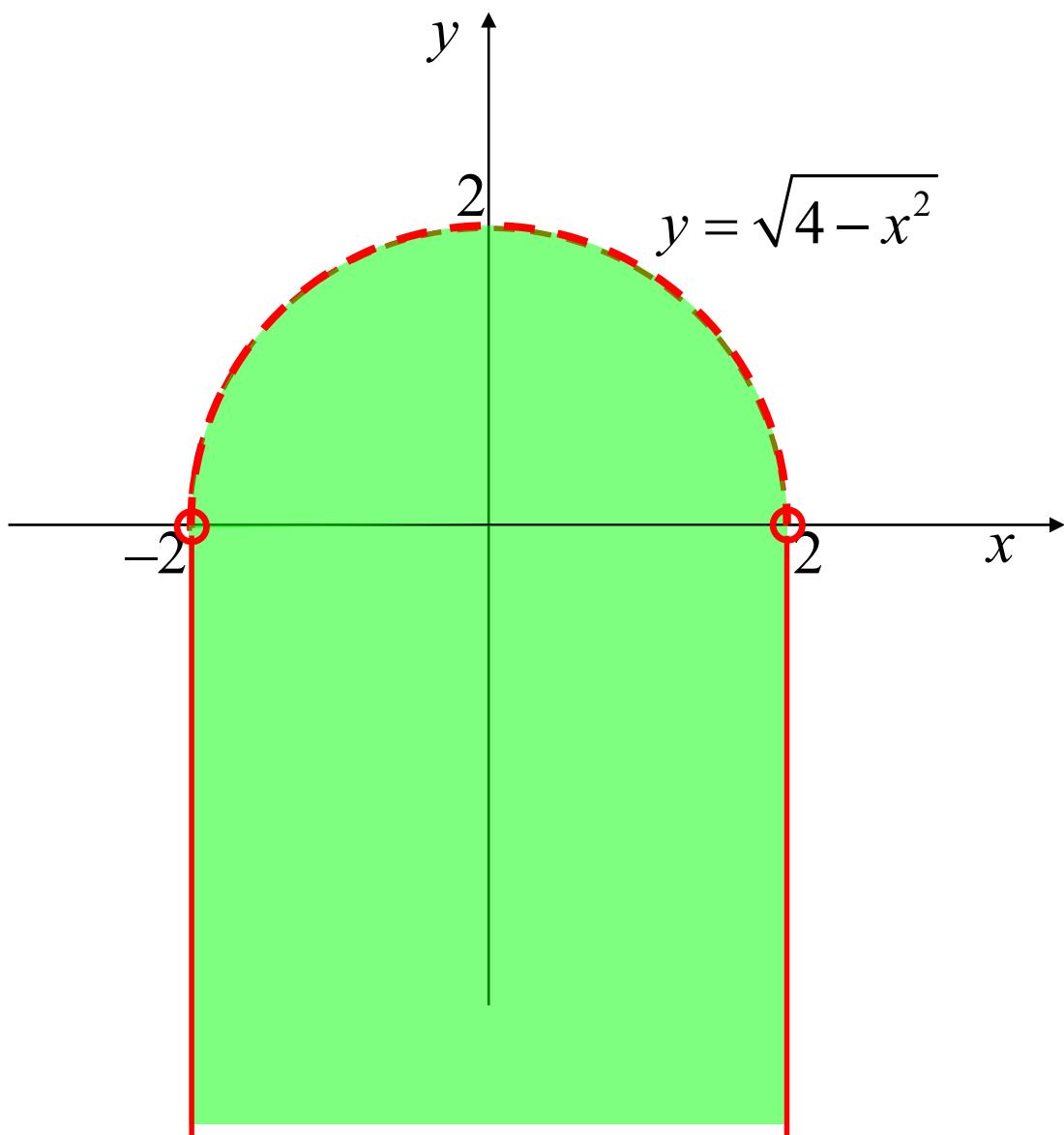
$0 \leq 1$ ✓ $\qquad$ $0 \leq 4$ ✓

point of intersection

$x^2 = 3x + 4$

$x^2 - 3x - 4 = 0$

$(x + 1)(x - 4) = 0$

$x = -1$ or $x = 4$

$y = x^2$

$y = 3x + 4$

$(4, 16)$

$(-1, 1)$
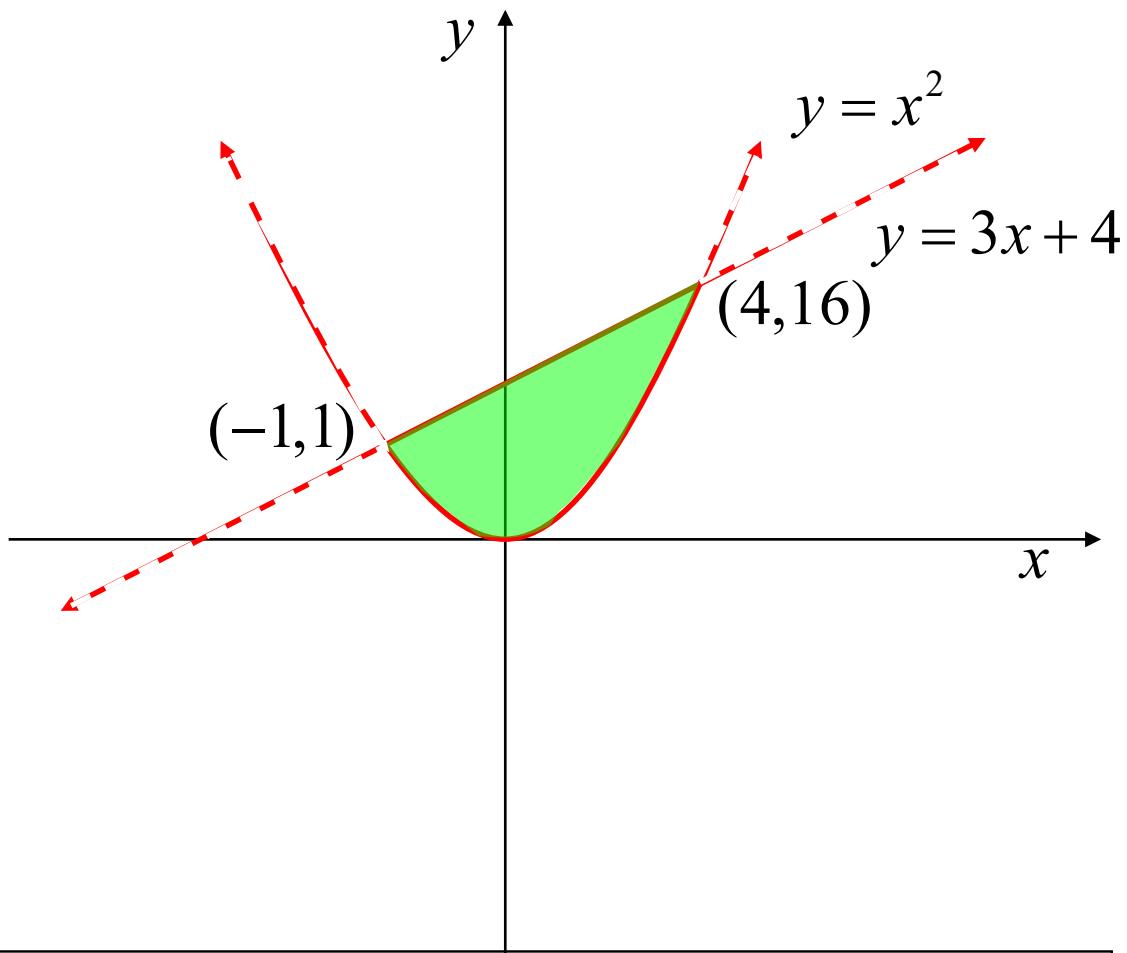
Exercise 3F; 3ac, 4d, 5bd, 6bc, 7, 10, 12a, 15a, 18, 19, 20, 22, 23