8. **(a)** Use the Euclidean Algorithm to find gcd(51, 303). (2 marks)

$303 = 51 \cdot 5 + 48$

$51 = 48 \cdot 1 + 3$

$48 = 3 \cdot 16 + 0$

$\therefore \gcd(51, 303) = 3$

(b) Find a pair of integers x and y that satisfy the linear diophantine equation

$$51x + 303y = 18.$$

$\gcd(51, 303) = 3$ and $3 \mid 18$ so a solution does exist. (3 marks)

$3 = 51 - 48$

$= 51 - [303 - 51 \cdot 5]$

$= 51(6) + 303(-1)$

$\therefore 18 = 51(36) + 303(-6)$ so $x = 36$, $y = -6$ is one solution.

9. Write the following sum using summation notation. (2 marks)

$$9 + 11 + 13 + 15 + 17 + 19$$

$$\sum_{i=4}^{9} (2i+1)$$