11.2 Arithmetic Sequences

$-2, 1, 4, 7, 10, 13, \ldots$

The common difference is 3

$a_2 - a_1 = 3$

$a_3 - a_2 = 4 - 1 = 3$

$a_6 - a_5 = 13 - 10 = 3$

Arithmetic Sequence

$a_1, a_1 + d, a_1 + 2d, a_1 + 3d, \ldots$

To find the nth term

$$a_n = a_1 + (n-1)d$$

Ex: Find the 68th term

16, 7, -2, ...

$d = a_2 - a_1 = 7 - 16 = -9$

$a_{68} = a_1 + 67d = 16 + 67(-9)$

$= 16 + (-603) = -587$

Ex: Find the 1st term if

$a_{31} = 197$ and $d = 10$

$a_{31} = a_1 + 30d$

$197 = a_1 + 30(10)$

$197 = a_1 + 300$

$a_1 = -103$

Ex: If $a_{10} = 4$ and $a_{17} = 20$

Find a_6

$a_{17} = a_{10} + 7d$

$20 = 4 + 7d$

$16 = 7d$

$d = \frac{16}{7}$

$a_{10} = a_6 + 4d$

$4 = a_6 + 4\left(\frac{16}{7}\right)$

$4 = a_6 + \frac{64}{7}$

$a_6 = 4 - \frac{64}{7} = \frac{28}{7} - \frac{64}{7}$

$a_6 = -\frac{36}{7}$