

$$10.2 \quad a_n = a_1 + (n-1)d$$

$$1) \quad a_1 = -19 \quad d = 15 \quad n = 32$$

$$a_{32} = -19 + (32-1)15 \\ = 446$$

$$2) \quad a_1 = -11 \quad d = -2 \quad n = 28$$

$$a_{28} = -11 + (28-1)(-2) \\ = -65$$

$$3) \quad a_1 = 9 \quad d = -3 \quad n = 73$$

$$a_{73} = 9 + (73-1)(-3) \\ = -207$$

$$4) \quad a_1 = \frac{1}{7} \quad d = \frac{2}{7} \quad n = 47$$

$$a_{47} = \frac{1}{7} + (47-1)\left(\frac{2}{7}\right) \\ = \frac{93}{7}$$

$$5) \quad a_1 = 14 \quad d = 4 \quad n = 100$$

$$a_{100} = 14 + (100-1)4 \\ = 410$$

$$6) \quad S_1: a_1 = -25 \quad d_1 \quad \begin{array}{l} 15^{\text{th}} \text{ term} \\ \text{is the same} \\ \text{so set them} \\ \text{equal} \end{array}$$

$$S_2: a_1 = 80 \quad d_2$$

$$-25 + (15-1)d_1 = 80 + (15-1)d_2$$

$$-25 + 14d_1 = 80 + 14d_2$$

$$14d_1 = 105 + 14d_2$$

$$14d_1 - 14d_2 = 105$$

$$\frac{14(d_1 - d_2)}{14} = \frac{105}{14}$$

$$\boxed{d_1 - d_2 = \frac{105}{14}}$$

$$10.3 \quad a_n = a_1 \cdot r^{n-1}$$

$$1) \quad a_1 = 2 \quad r = -2 \quad n = 13$$

$$a_{13} = 2 \cdot (-2)^{13-1}$$

$$= \boxed{8192}$$

$$2) \quad a_1 = -1 \quad r = -1 \quad n = 137$$

$$a_{137} = -1 \cdot (-1)^{137-1}$$

$$= \boxed{-1}$$

$$3) \quad a_1 = 5 \quad r = 7 \quad n = 11$$

$$a_{11} = 5 \cdot 7^{11-1}$$

$$= 14,123,76,245$$

$$4) \quad a = 64 \quad r = \frac{1}{2} \quad n = 8$$

$$a_8 = 64 \cdot \frac{1}{2}^{8-1}$$

$$= \boxed{\frac{1}{2}}$$

10.4 $S_n = \frac{n}{2}(a_1 + a_n)$

n	1	2	3	4	5	6	7
a_n	51	54	57	60	63	66	69

$S_n = 810$ what is n?

Use explicit

$a_n = 51 + (n-1)3$

$a_n = 3n + 48$

use series formula

$810 = \frac{n}{2}(51 + a_n)$

$810 = \frac{n}{2}(51 + 3n + 48)$

$1620 = n(51 + 3n + 48)$

$1620 = n(99 + 3n)$

$1620 = 99n + 3n^2$

$-1620 \quad -1620$

$0 = 3n^2 + 99n - 1620$

Use quadratic formula

$n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$n = \frac{-99 \pm \sqrt{(99)^2 - 4(3)(-1620)}}{2(3)}$

$n = \frac{-99 \pm \sqrt{9801 + 19440}}{6}$

$n = \frac{-99 \pm \sqrt{29241}}{6}$

$n = \frac{-99 \pm 171}{6}$

$\frac{-99 + 171}{6} = 12$

negative n does not make sense

~~$\frac{-99 - 171}{6} = -45$~~

n=12 so what was the nth term?

$a_{12} = 51 + (12-1)3$
 $= 84$

2) See video 5C

3) $a_1 = 671$ $d = 1250$ $a_{48} = 59421$

$S_{48} = \frac{48}{2}(671 + 59421)$

$= 1492208$

4) find d $\rightarrow d = 18$

find $a_1 \rightarrow 18 = a_1 + (5-1)18$ $a_1 = -54$

find $a_{12} \rightarrow a_{12} = -54 + (12-1)18$ $a_{12} = 144$

$S_{12} = \frac{12}{2}(-54 + 144)$

$= 540$

$$5) \text{ find } a_1 \rightarrow 3(1) - 2 = a_1 = 1$$

$$\text{find } a_{45} \rightarrow 3(45) - 2 \quad a_{45} = 133$$

$$S_{45} = \frac{45}{2} (1 + 133)$$

$$= 3015$$

10.5

$$S_n = \frac{a(1-r^n)}{1-r}$$

1) find $a_{15} \rightarrow 15^3 - 15^2 = 3150$

$$S_6 = \frac{3150 \left(1 - \frac{128^6}{105}\right)}{1 - \frac{128}{105}}$$

