

# Homework #4 MAT100 Key

①

1. 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, ...  
 $F_0$   $F_1$   $F_2$   $F_3$   $F_4$   $F_5$

2.  $\frac{610}{377} = 1.618037135$

3.  $\frac{1+\sqrt{5}}{2} = 1.618033989$  pretty close

4.  $F_{21} = 10,946$

5.  $F_{120} \approx 5.358 \times 10^{24}$

6.  $\varphi^5 = 5\varphi + 3$  (in text book)

$\varphi^6 = \varphi(\varphi^5) = \varphi(5\varphi + 3) = 5\varphi^2 + 3\varphi = 5(\varphi + 1) + 3\varphi = 5\varphi + 5 + 3\varphi = 8\varphi + 5$

$\varphi^7 = \varphi(\varphi^6) = \varphi(8\varphi + 5) = 8\varphi^2 + 5\varphi = 8(\varphi + 1) + 5\varphi = 13\varphi + 8$

$\varphi^8 = \varphi(13\varphi + 8) = 13\varphi^2 + 8\varphi = 13(\varphi + 1) + 8\varphi = 21\varphi + 13$

$\varphi^9 = \varphi(21\varphi + 13) = 21\varphi^2 + 13\varphi = 21(\varphi + 1) + 13\varphi = 34\varphi + 21$

$\varphi^{10} = \varphi(34\varphi + 21) = 34\varphi^2 + 21\varphi = 34(\varphi + 1) + 21\varphi = 55\varphi + 34$   
 $F_{10}\varphi + F_9$

7. Attached

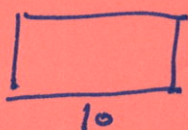
8. 55 are born and 144 is new total

9. a. is (see #1)

b. is not

10. two shape are similar if all angles are the same and all corresponding sides change by the same ratio

11.



$A = 60$



$A = 30 \times 18 = 540$

30

12. paper  $8.5 \times 11$

$\frac{11}{8.5} \approx 1.29$

picture frame

$8 \times 10$

$\frac{10}{8} \approx 1.25$

TV  $25 \times 20$

$\frac{25}{20} \approx 1.25$

not very

13. Attached