

Midterm III  
Math 116  
Summer 2004  
August 20, 2004

**Show all your work for every problem. Correct answers without adequate supporting work will receive little or no credit.**

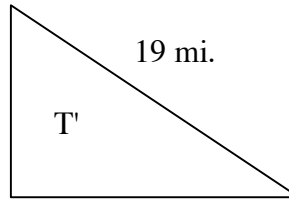
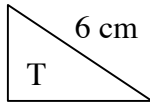
- 1.) If  $F_{28} = 317,811$  and  $F_{29} = 514,229$ , find  $F_{27}$  and  $F_{30}$ .

<b>6</b>

- 2.) Since each Fibonacci number is close to  $\Phi$  times the previous Fibonacci number, we can approximate Fibonacci numbers pretty easily. If  $F_{233}$  is close to  $2.211 \times 10^{47}$ , find an approximate value for  $F_{234}$ .

<b>5</b>

3.) T and T' are similar triangles.

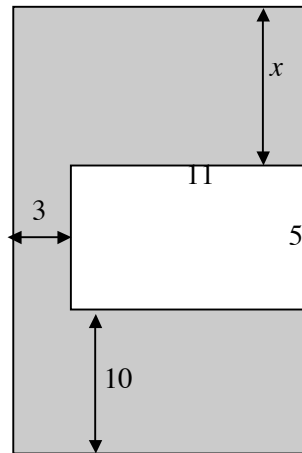
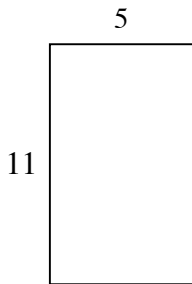


a.) If the perimeter of T is 15 cm, what is the perimeter of T' (in miles) ?

b.) If the area of T is  $32 \text{ cm}^2$ , what is the area of T' (in square miles)?

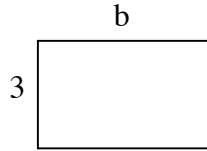
<b>6</b>

4.) Find the value of  $x$  so that the shaded figure is a gnomon to the white rectangle.



<b>8</b>

- 5.) The rectangle below is a golden rectangle. What is the length of side  $b$ ?



<b>5</b>

- 6.) Consider a population that grows according to the linear growth model. The initial population is  $P_0 = 31$ , and the population in the 10th generation is  $P_{10} = 71$ .

a.) Find the common difference  $d$ .

b.) Find  $P_{20}$ .

c.) Give an explicit description of the population sequence.

d.) How many generations will it take for the population to exceed 150?

<b>10</b>

- 7.) A population grows according to the exponential growth model. The starting population is  $P_0 = 100$ , and the common ratio is  $r = 1.4$ . If the generations happen three times a year, what is the size of the population after 2 years?

<b>10</b>

- 8.) A population grows according to the logistic growth model with  $p_0 = 0.9$  and  $r = 0.8$ . Find  $p_1$  up to  $p_4$ , and give a prediction of what will happen to the population in the future.

<b>10</b>

- 9.) Suppose you wish to deposit \$2,500.00 in a savings account for 5 years.  
Bank A offers you 10% interest, compounded annually.  
Bank B offers you 9.75% interest, compounded monthly.  
Which bank do you choose and why?

