Math 120 A - Spring 2018
Final Exam
June 2, 2018

Student's name: _____ Student ID no. : _____

Student's signature: _____ Section: _____

1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
Total	70	

- Fill in all information above. Unsigned exams will not be graded.
- Complete all questions.
- You may use a TI30XIIS calculator during this examination. No other electronic devices are not allowed, and they should be turned off and put away for the duration of the exam.
- If you use a trial-and-error or guess-and-check method when an algebraic method is available, you will not receive full credit.
- You may use one hand-written 8.5 inch by 11 inch sheet of notes. Write your name on your notesheet and turn it in with your exam.
- Show all work for full credit.
- You have 170 minutes to complete the exam.

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1. Edwina is suffering from Sinsoidal fever. Her body temperature is a sinusoidal function of time. Today, at 5 AM, her temperature was at its maximum, 104 degrees Fahrenheit. Her temperature then dropped, reaching its minimum of 97 degrees Fahrenheit at 9:30 AM.

   How much time today (from midnight to midnight) will her temperature be above 101 degrees Fahrenheit?

2. The height of a certain tree is a linear-to-linear rational function of time. One year from today, the tree will be 7 feet tall. Six years from today, the tree will be 18.5 feet tall.

   The height of the tree will always increase, but will never be more then 30 feet tall.

   When will the tree be 27 feet tall?

3. Let $f(x) = 3x + 2$ and $g(x) = (x - 4)^2 - 5$.

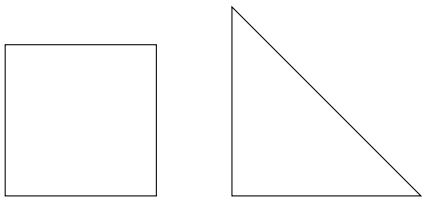
   (a) Let $h(x) = f(g(x))$ restricted to the domain $x \leq 4$. Find $h^{-1}(x)$.

   (b) Solve the following equation for x: $\dfrac{g(x+4) - g(x)}{6} = 10$

4. You have 500 meters of fencing with which to make two enclosures.

   One enclosure will be in the shape of a square, and the other will have the shape of an isosceles right triangle.

   For example, the enclosures might look like this:



   How long should the legs of the triangular enclosure be to minimize the combined area of the two enclosures?

5. You are climbing a pole some distance from a tall building. When you reach a point 20 meters above the ground, you measure the angle of elevation of the building (i.e., the angle that the top of the building makes with the horizontal) and find this angle is $60°$.

   You then climb 10 meters farther up the pole, and measure the angle again. This time the angle is $57°$.

   How tall is the building?

6. Boris and Stella are walking on a circular path which has a radius of 1000 meters. They start walking at the same time. Boris starts at the northernmost point of the path, and Stella starts at the easternmost point. Boris walks clockwise. Stella walks counterclockwise, and she walks three times as fast as Boris walks. They pass each other for the first time after 300 seconds.

   How far (in a straight line) is Boris from his staring point when he has been running for 1500 seconds?

7. Imogene is sailing near a buoy with a radar antenna on it. She sails at a constant 4 miles per hour. The buoy's radar can detect her boat when she is within 5 miles of it. Imogene starts sailing from a point 9 miles EAST and 2 miles NORTH of the buoy. She sails due WEST for 1.5 hours, then turns and sails due directly to a point 16 miles NORTH and 4 miles WEST of the buoy.

   How much time did Imogene spend within 5 miles of the buoy?