Math 120 A - Autumn 2016
Midterm Exam Number One
October 20th, 2016

Name: _____   Student ID no. : _____

Signature: _____   Section: _____

1	15	
2	15	
3	8	
4	8	
5	14	
Total	60	

- This exam consists of FIVE problems on FIVE pages, including this cover sheet.

- Show all work for full credit.

- You may use a TI-30X IIS calculator during this exam. Other calculators and electronic device are not permitted.

- You do not need to simplify your answers.

- If you use a trial-and-error or guess-and-check method when a more rigorous method is available, you will not receive full credit.

- If you write on the back of the page, please indicate that you have done so!

- You may use one hand-written double-sided 8.5" by 11" page of notes.

- You have 50 minutes to complete the exam.

1. **[15 points]** Candela stands 10 meters west and 16 meters south of a gym. Spark stands 3 meters east and 11 meters north of the gym.

   Candela walks due east until she is 17.8 meters away from the gym. Then, she turns and walks in a straight line towards Spark.

   How close does Candela get to the gym?

2. **[5 points per part]** Luke and Reva begin walking in the xy-plane at constant speeds at the same time.

Luke walks from $(3, 5)$ to $(-2, 4)$ in a straight line, reaching it in 10 seconds.

Reva walks from $(-4, 6)$ in a straight line. When Luke crosses the y-axis, Reva is at $(4, 1)$.

(a) Write parametric equations for Luke's position, t seconds after he starts walking.

(b) Write parametric equations for Reva's position, t seconds after she starts walking.

(c) When is Luke directly east of Reva?

3. **[8 points]** Consider the following multipart function f:

$$f(x) = \begin{cases} 0 & \text{if } x \leq 0 \\ x + 5 & \text{if } 0 < x < 4 \\ x^2 + 6 & \text{if } x \geq 4 \end{cases}$$

Find all solutions to the equation $f(x) = x^2 - 1$.

4. **[8 points]** Find all values of d such that the vertex of $y = dx^2 + 5x + d + 1$ is on the x-axis.

5. **[14 points]** Ken sells sweaters. His profit is a quadratic function of the price he charges.

   If he gives the sweaters away for free, he will **lose** $100.

   If he charges $10 per sweater, he will **earn** $80.

   If he charges $20 per sweater, he will **earn** $180.

   How much will he earn by charging $33 per sweater?