Department of Mathematics

Ma162 First Exam
June 17, 2010

DO NOT TURN THIS PAGE UNTIL INSTRUCTED TO DO SO.

Instructions: Be sure that your name, section number, and student ID are filled in below. Cell phones must be OFF and put away before you open this exam. You may use calculators (including graphing calculators, but no laptops or cellphone calculators) for checking numerical calculations, but you must show your work to receive credit. Put your answers in the answer boxes provided, and show your work. If your answer is not in the box or if you have no work to support your answer, you will receive no credit. The test has been carefully checked and its notation is consistent with the homework problems. No additional details will be provided during the exam.

Problem	**Maximum**	**Actual**
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

Name: _____
Section: 020
Last four digits of Student ID: _____

1. The citizens of snowy Niveus created a new temperature scale so that they would occasionally see negative triple digit temperatures, but with room temperature still in the seventies. They called their scale Nivvyheit, or N for short, with the conversion formula: $N = \frac{11}{5}(F - 30)$ where F is the Fahrenheit temperature.

   a) When is the Fahrenheit temperature equal to 5 times the Nivvyheit temperature?

   Answer: When $F =$ [ ]

   b) Can 11 times the Fahrenheit temperature be equal to 60 more than 5 times the Nivvyheit temperature? $(11F = 5N + 60)$ Why or why not?

   Answer: [ ]

2. A courier is traveling from Atlanta $(9, 2)$ to Decatur $(0, 6)$, but needs to check-in with both of the offices in Birmingham $(0, 0)$ and Chattanooga $(8, 7)$. He must pass through **both of the cities** $B(0, 0)$ or $C(8, 7)$ along the way. Assume he travels a straight line between cities.

   (a) Which city should he pass through first (B or C) in order to minimize his trip distance from A to D?

   He should first pass through the city [ ] on his way to D.

   (b) What is the total length of this trip from A to D?

   Minimum trip length is: [ ]

3. Point A has coordinates $(2, 3)$, and point B has coordinates $(6, 1)$.

   a) What is the distance from A to B and what is the slope of the line through A and B?

   Distance: ☐ Slope: ☐

   b) Find the number y so that the point C with coordinates $(5, y)$ lies in the first quadrant and triangle ABC is a right triangle with right angle at A. (Note: The coordinates of A and B were given at the top of the problem.)

   $y =$ ☐

4. The Flörgerstrøm company makes valve cleaning units for flügelhorns. The cost function for their manufacturing line is $C = 2x + 3500$, where x is the number of VCUs produced per month and C is measured in dollars. The company expects \$7 in revenue per unit.

   a) Determine the linear profit function for the Flörgerstrøm company in the usual form $P = m\,x + b$, assuming they can sell all the units they manufacture.

   $P =$ [ ]

   b) Determine the break-even value for x and the break-even cost C at that value for x.

   $x =$ [ ] $C =$ [ ]

5. In a free market, the supply equation for a supplier of sorghum is $x = 28p + 97$ where the price p is in dollars and x is in bushels. When the price is \$3 per bushel the demand is 300 bushels. When the price goes up to \$6 per bushel the demand is 180 bushels. Assuming that the demand function is also linear, find the equilibrium price and the number of bushels supplied at that equilibrium price.

$p =$ $\qquad$ $x =$