Midterm Exam II
Fall 2013, MAT172 Section B401[19441]
November 5th, 2013. 9:00AM–10:40AM.

Instructions: Print your name on the exam booklet. This exam is closed-book and closed-note. You cannot use any electronic device in this exam. You are not allowed to talk to other students. Write all details explicitly. Answers without justifications and/or calculation steps may receive no score. Hand-in blue booklet only, and keep the exam paper for your study.

1.(Sample Final I-5) Draw the graph of $y = 3x^2 + 6x + 10$ and label its minimum.(4 points)

2.(Sample Final I-5) Draw the graph of $y = -2x^2 + 8x + 2$ and label its maximum.(4 points)

3.(Sample Final I-9) Write an equation of the parabola given its graph in Figure 1.(4 points)

4.(Sample Final I-9) Write an equation of the parabola given its graph in Figure 2.(4 points)

5.(Sample Final I-10) Let $f(x) = 2e^{x-1}$. Write the inverse of f and specify its domain.(4 points)

6.(Sample Final I-10) Let $g(x) = \frac{1}{2}e^{3x}$. Write the inverse of g and specify its domain. (4 points)

7.(Sample Final I-16) If a publisher charges \$50 for a textbook, she will sell 8000 copies. For each \$1 she raises the price, she sells 100 fewer copies, and for each \$1 she lowers the price, she sells 100 more copies.
(1) How much should she charge to maximize revenue?(6 points)
(2) How many books will she sell at that rate?(2 points)

8.(Sample Final I-16) Sixty meters of fencing are to be used to enclose a rectangular garden. Find the dimensions that will give the maximum area.(8 points)

9.(Sample Final I-16) The revenue from the sale of x items is $R(x) = 800x - 2x^2$ dollars and the cost to produce these x items is $C(x) = 2x^2 + 1000$ dollars. How many items should be produced to maximize profit?(8 points)

10.(Sample Final I-17) There are 100 bacteria in a culture, and the number of bacteria triples every 5 hours.
(1) How many will there be in 30 hours?(2 points)
(2) Write a function that gives the number of bacteria t hours from now.(3 points)
(3) In how many hours will there be 1800 bacteria?(3 points)
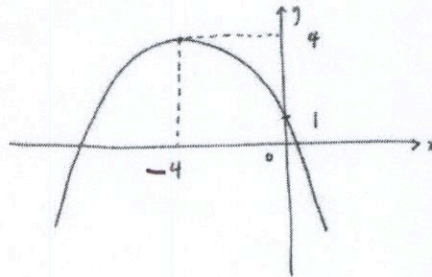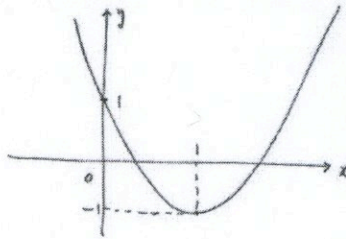
1

Figure 1: Problem 3

Figure 2: Problem 4

11.(Sample Final I-17) The population of West Oblivion was 600 in 1850 and is known to double every 25 years.
(1) What was the population in 2000?(2 points)
(2) Write a function, P, that gives the population y years after 1850.(3 points)
(3) In what year did the population first exceed 4000?(3 points)

12.(Sample Final I-17) A bank account receives 3% annual interest compounded quarterly. If $1000 is deposited into the account initially and no other deposits are made, write a formula for D, the amount of money in the account after t years. How many years will it take for the amount of money in the account to double?(8 points)

2