MA 123 Fall 2024 Exam 3

Elementary Calculus 11/21/24

Name: Grader

Student ID #: 9_____ **Sec:** _____

Do not remove the answer page — you will turn in the entire exam. You have two hours for this exam. No books or notes may be used. You may use an ACT-approved calculator during the exam, but NO calculator with a Computer Algebra System (CAS), networking, or camera is permitted. Absolutely no cell phone use during the exam is allowed.

The exam consists of 2 short answer questions and 18 multiple choice questions. Answer the short answer questions on the back of this page, and record your answers to the multiple choice questions on this page. For each multiple choice question, you will need to fill in the circle corresponding to the correct answer. For example, if (a) is correct, you must shade

(a) (b) (c) (d) (e)

It is your responsibility to make it CLEAR which response has been chosen. **You will not get credit unless the correct answer has been clearly marked on this page.**

GOOD LUCK!

3. (a) (b) (c) **(d)** (e)   12. **(a)** (b) (c) (d) (e)

4. **(a)** (b) (c) (d) (e)   13. (a) (b) **(c)** (d) (e)

5. (a) **(b)** (c) (d) (e)   14. (a) **(b)** (c) (d) (e)

6. (a) (b) **(c)** (d) (e)   15. **(a)** (b) (c) (d) (e)

7. (a) (b) (c) **(d)** (e)   16. (a) (b) (c) (d) **(e)**

8. (a) (b) (c) (d) **(e)**   17. (a) **(b)** (c) (d) (e)

9. **(a)** (b) (c) (d) (e)   18. (a) (b) (c) **(d)** (e)

10. (a) (b) (c) (d) **(e)**   19. (a) (b) (c) **(d)** (e)
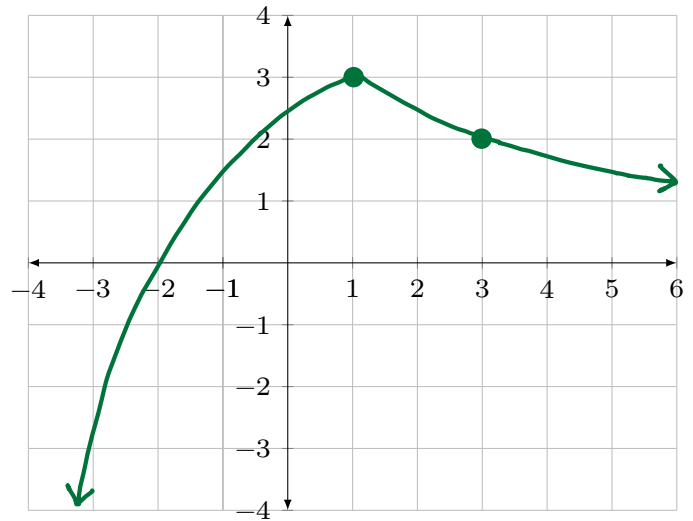
11. (a) **(b)** (c) (d) (e)   20. (a) (b) **(c)** (d) (e)

Each question is an opportunity to earn 5 points. Points are earned on the clarity and correctness of your work, not merely on having a correct answer somewhere.

1. Sketch the graph of a continuous function $y = f(x)$ which satisfies the following properties:
   $f(3) = 2$, $f'(x) > 0$ on $(-\infty, 1)$, $f'(x) < 0$ on $(1, \infty)$, $f''(x) < 0$ on $(-\infty, 1)$ and $f''(x) > 0$ on $(1, \infty)$.

   Note. There are many possible graphs.

2. Determine the area of the largest rectangle with one corner at the origin, the opposite corner in the first quadrant on the graph of $y = 507 - 64x^2$, and sides parallel to the axes. **You must show all steps of an optimization problem to earn full credit.**

   largest area = 549.25

   $y = 507 - 64x^2$