

You may remove the formula sheet and multiplication table, but do not remove any other pages from the exam. You have two hours to do this exam. **No books, notes, or calculator may be used. Absolutely no 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

Short Answer Questions

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. Determine the derivative of $f(x) = (2x^7 + \ln(x)) \cdot e^{4x-6}$ using the product rule. **You must determine each derivative in the product rule, but do NOT simplify your answer.**
Circle your final answer.

$$f'(x) = (14x^6 + \frac{1}{x}) \cdot e^{4x-6} + (2x^7 + \ln(x)) \cdot 4e^{4x-6}$$

2. Determine the minimum value of $g(x) = 9x^2 - 18x + 20$ on the interval $[0, 4]$. **It must be clear from your work that the minimum value has been achieved to receive full credit.**
Circle your final answer.

$$\text{minimum} = 11$$