

Math 131 **NEATLY PRINT NAME:** _____

Exam 2 items **STUDENT ID:** _____

Fall 2007 **DATE:** _____

Scarborough **EMAIL:** _____

"On my honor, as an Aggie, I have neither given nor received unauthorized aid
on this academic work."

Signature of student

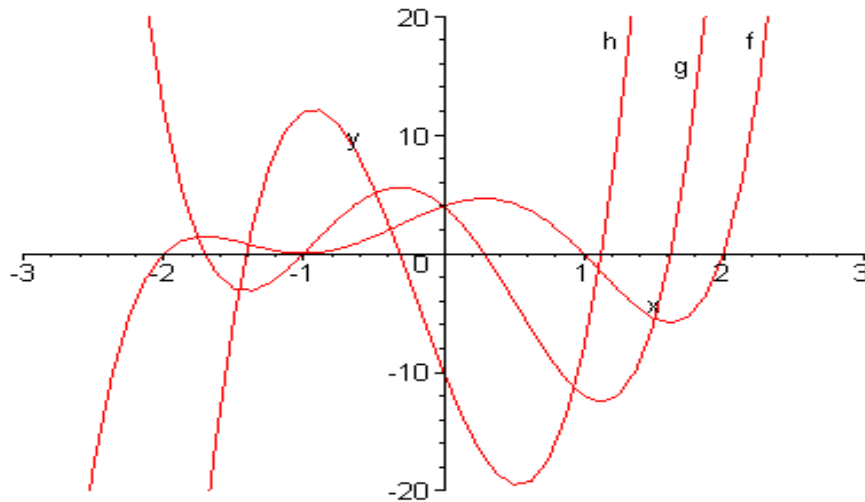
Academic Integrity Task Force, 2004
<http://www.tamu.edu/aggiehonor/FinalTaskForceReport.pdf>

MUTIPLE-CHOICE: There is no partial credit on the multiple-choice questions. You must circle the correct answer(s) on each to receive credit on the multiple-choice questions.

Work Out: Write all solutions in the space provided as full credit will not be given without complete, correct accompanying work, even if the final answer is correct. State any special features or programs you use on your calculator. Put your final answer in the blank provided. Remember your units! Where needed, use complete sentences.

You must clear your calculator. MEM (2nd +), Reset, ALL, Reset

1. Mark all statements that are true based on the given graphs.



- The function $g''(x) = h'(x) = f(x)$.
- None of these
- The function $h''(x) = g'(x) = f(x)$.
- The function $f''(x) = g'(x) = h(x)$.
- The function $h''(x) = f'(x) = g(x)$.

2. Find the derivative of $f(x) = 4xe^x(5-x)^3$.

- none of these
- $f'(x) = -12xe^x(5-x)^2 + (4xe^x + 4e^x)(5-x)^3$
- $f'(x) = 12e^x(5-x)^2$
- $f'(x) = 12xe^x(5-x)^2 + (4xe^x + 4e^x)(5-x)^3$
- $f'(x) = -12xe^x(5-x)^2 + 4xe^x(5-x)^3$

3. Exactly find $f'(3)$ where $f(x) = 2^{4x}$.

- $16384 \ln(2)$
- 24576
- $4096 \ln(2)$
- none of these
- 4096

4. The number of customers at CS Bank is shown in the table.

t years after 2020	1	7	11	15	20
n(t) customers	11300	12788	13780	14772	16012

The amount of loans given to the CS Bank customers is $a(t) = 6t + e^{-t}$ million dollars for t years after 2020 for $1 \leq t \leq 20$.

- a. Find the model $n(t)$ for the number of CS Bank customers based upon data.

- b. Find the average loan amount per customer, $L(t)$.

- c. Find rate of change of the average loan amount per customer in the year 2030.
 - A. $\frac{\$362.13}{customer}$ per year
 - B. $\frac{\$4433.94}{customer}$ per year
 - C. $\frac{\$258.64}{customer}$ per year
 - D. none of these
 - E. $\frac{\$193.92}{customer}$ per year

- d. Find the percentage rate of change of the average loan in the year 2025.
 - A. 0.04% per year
 - B. 17.96%
 - C. none of these
 - D. 0.04%
 - E. 17.96% per year

5. Given $f(x) = 2x^3 + 3x^2 - 936x + 30$.

a. Use derivatives to find the relative extrema.

_____ is/are the relative maxima **point(s)**.

_____ is/are the relative minima **point(s)**.

b. _____ Use derivatives to find the inflection **point(s)**.

c. _____ On what interval(s) is the function f concave up?

d. Find the absolute extrema of $f(x) = 2x^3 + 3x^2 - 936x + 30$ on the interval $5 \leq x \leq 15$.

_____ is the absolute maxima **point**
on the interval $5 \leq x \leq 15$.

_____ is the absolute minima **point**
on the interval $5 \leq x \leq 15$.

6. Find the derivative of $y = \left(\ln(9x^3 - 5x + 6e)\right)^4$.

7. If $f'(x) > 0$ and $f''(x) < 0$ on some interval, then on the same interval the graph of the function $f(x)$ is

- a. decreasing and concave down
- b. decreasing and concave up
- c. none of these
- d. increasing and concave down
- e. increasing and concave up

8. Find the rate of change of $f(x) = \ln\left(\frac{8}{x^2}\right)$.

9. The amount of \$4580.50 is invested in a bank account with an APR of 6.25% compounded monthly.

a. Find the equation for the balance in the account after t years.

b. How much is in the account after 4 years?

c. How rapidly is the value of the account growing after 4 years?

d. Use the answers in parts *b* and *c* to approximate the value of the account after 4 years and 9 months.

- A. none of these
- B. \$6152.46
- C. \$6216.85
- D. \$6159.00
- E. \$6244.06

11. Exactly find $f'(2)$ where $f(x) = 3^{5x}$.

- a. 295245
- b. $196830 \ln(3)$
- c. 59049
- d. $295245 \ln(3)$
- e. none of these

12. Find the rate of change of $f(x) = \ln\left(\frac{9}{x^3}\right)$.

13. The amount of \$5349.00 is invested in a bank account with an APR of 7.5% compounded monthly.

a. How much is in the account after 5 years?

b. How rapidly is the value of the account growing after 5 years?

c. Use the answers in parts *a* and *b* to approximate the value of the account after 5 years and 3 months.

- A. \$7948.03
- B. none of these
- C. \$8354.88
- D. \$7918.97
- E. \$7920.34