

Clearly mark answers to the multiple choice problems on your paper and your scantron.

1. [5 pts] Find the limit, if it exists for  $\lim_{x \rightarrow 2^-} \frac{3}{x-2} + 1$ .

(a) - 1

(b) 1

(c)  $\infty$

(d)  $-\infty$

(e) none of these

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2. [5 pts] Find the limit, if it exists for  $\lim_{x \rightarrow -1} \frac{x^2 - 2x - 3}{x^2 - 5x - 6}$ .

(a) 1

(b)  $\frac{4}{7}$

(c) *d.n.e.*

(d) 0

(e) none of these

3. [5 pts] How long will it take a population of 25 bacteria to triple at a growth rate of 5%?

(a)  $t = \frac{\ln 3}{.05}$

(b)  $t = \frac{\ln 3}{5}$

(c)  $t = \frac{\ln \left( \frac{3}{25} \right)}{.05}$

(d)  $t = \frac{\ln \left( \frac{3}{25} \right)}{5}$

(e) none of these

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4. [5 pts] Find all points at which  $\frac{\ln(1-x)}{\ln(1+x)}$  is continuous.

(a)  $(-\infty, -1) \cup (-1, 0)$

(b)  $(-1, 0) \cup (0, 1)$

(c)  $(0, 1) \cup (1, \infty)$

(d)  $(-\infty, -1) \cup (1, \infty)$

(e) none of these

5. [5 pts] Find a value  $c$  so that the following function is continuous for all values of  $x$ :

$$f(x) = \begin{cases} 1 - x^2, & x \leq 2 \\ cx + 1, & x > 2 \end{cases}$$

- (a) 0
  - (b) 1
  - (c) -1
  - (d) 2
  - (e) none of these
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6. [5 pts] Which of the following functions corresponds with the semilog graph below.

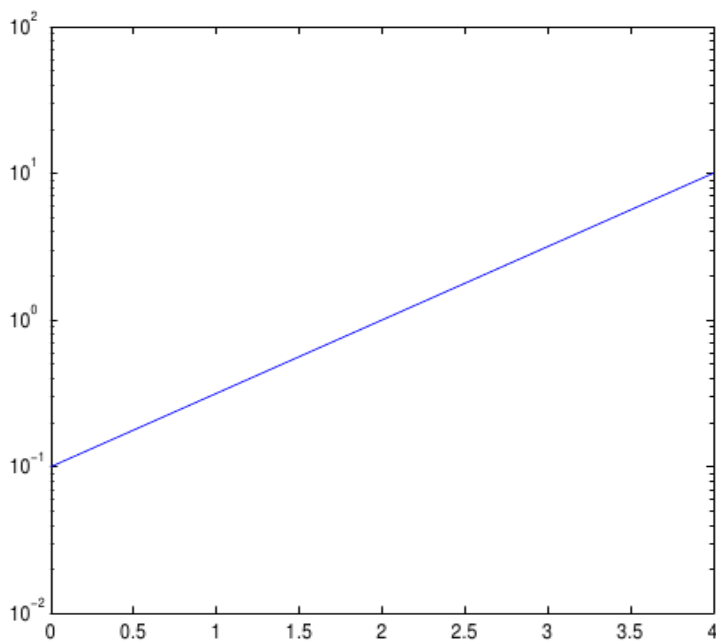
(a)  $y = \frac{1}{2}x - 1$

(b)  $y = \frac{1}{2} \log x$

(c)  $y = 10^{x/2} + \frac{1}{10}$

(d)  $y = \frac{1}{10}(\sqrt{10})^x$

(e) none of these



7. [5 pts] Find the limit, if it exists for  $\lim_{x \rightarrow 0} \frac{4 \cos x - 4 + 3 \sin x}{5x}$ .

(a)  $\frac{3}{5}$

(b)  $\frac{4}{5}$

(c)  $-\frac{4}{5}$

(d) 0

(e) none of these

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8. [5 pts] Find the limit, if it exists for  $\lim_{x \rightarrow -\infty} \frac{x^2}{1-x}$ .

(a) -1

(b) 1

(c)  $\infty$

(d)  $-\infty$

(e) none of these

9. [5 pts] Use a logarithmic transformation to find a linear relationship between appropriate transformations of  $x$  and  $y$  if  $y = 4x^5$ .

- (a)  $\log y = 4x + \log 5$
  - (b)  $\log y = 5x + \log 4$
  - (c)  $\log y = 5 \log x + \log 4$
  - (d)  $\log y = 4 \log x + \log 5$
  - (e) none of these
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10. [5 pts] Let  $f(x) = x^4 + x^3 + x - 1$ . Using the Intermediate Value Theorem and the Bisection Method, what is the smallest interval on which we can conclude that  $f(x)$  has a root?

- (a)  $(-1, 0)$
- (b)  $(0, 1)$
- (c)  $\left(0, \frac{1}{2}\right)$
- (d)  $\left(\frac{1}{2}, 0\right)$
- (e) none of these

11. [10 pts.] (a) Graph  $f(x) = e^x$  and show that it is one to one. Graph  $f(x) = \ln x$  and show algebraically that it is the inverse of  $f(x) = e^x$ . List the domain and range of each function.

(a) (b) Solve  $\log(x^2 - 1) - \log(x + 1) = 1$

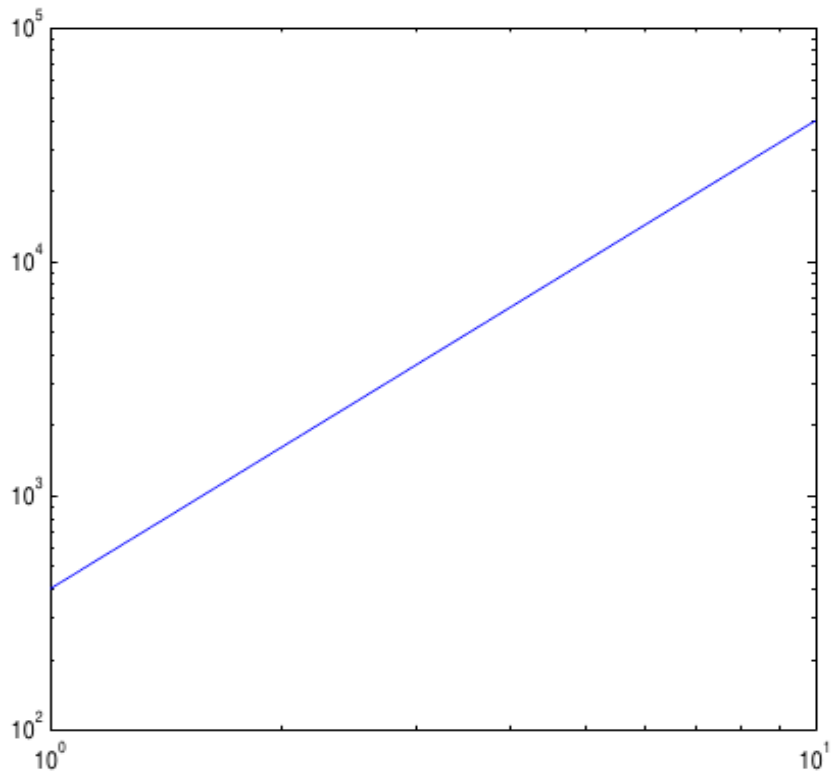
12. [10 pts.] Given  $f(x) = \begin{cases} \frac{1}{(x+3)} - 1, & x \neq 2 \\ 2, & x = 2 \end{cases}$ , carefully graph  $f(x)$  and determine by the 3 step definition of continuity if  $f(x)$  is continuous at  $x = 2$ .

13. [5 pts. each] Compute each of the following limits.

(a)  $\lim_{x \rightarrow 0} 2x^2 \cos\left(\frac{10}{x}\right)$

(b)  $\lim_{x \rightarrow 0} e^{-\left(\frac{\frac{1}{x+1} - 1}{x}\right)}$

14. Given the doublelog plot below, find a functional relationship between  $x$  and  $y$ .





15. [10 pts] (a) Use the limit definition of the derivative to find  $f'(x)$  for  $f(x) = \sqrt{2x - 1}$ .

(b) Find the equation of the tangent to  $f(x) = \sqrt{2x - 1}$  at  $x = 1$ .

MATH 147

EXAM I

NAME \_\_\_\_\_

SECTION # \_\_\_\_\_

SEAT # \_\_\_\_\_

Clearly mark answers to the multiple choice problems on your paper and your scantron.

In order to obtain full credit for partial credit problems, all work must be shown. Credit will not be given for an answer not supported by work.

"An Aggie does not lie, cheat or steal or tolerate those who do."