

Exam #2

April 5, 2017

Name _____

- You will be told when to begin the work and when to terminate work on the examination. You must stop when instructed. Points may be deducted in case of violations.
- Please show your work to support your answers that require calculations. Correct but unsupported answers may not be given full credit.
- The use of a cell phone or other electronic communication devices during the examination is not allowed. The exam will be canceled and a grade of "0" will be assigned to anyone who opens a cell phone during the examination or if one is found on their seat or hand.

No graphing calculators are allowed!!

1. (10 points) Consider the function $f(x) = x^3 - 12x$.

(a) Find the interval(s) where the function is increasing and the interval(s) where it is decreasing.

(b) Find the absolute minimum and the absolute maximum of f on $[0, 3]$

2. (10 points) Find the relative extrema, if any, of the function.

(a) $f(x) = \frac{1}{1+x^2}$

(b) $f(t) = t^5 - 5t$

3. (15 points) Let $f(x) = 3x^4 + 4x^3$

(a) Find the interval(s) where the function is increasing and the interval(s) where it is decreasing.

(b) Find the interval(s) where the function is concave up and the interval(s) where it is concave down.

(c) Find the x - and y - intercepts.

(d) Sketch the graph of $f(x)$. [Hint: Plot $f(-1)$, $f(0)$, $f(1)$ and the x - and y - intercepts first.]

4. (10 points) Find the interval(s) where the function is concave up and the interval(s) where it is concave down.

$$f(x) = \frac{x}{x-3}$$

5. (10 points) Find the interest rate needed for an investment of \$5,000 to double in 15 years if interest is (a) compounded continuously, (b) compounded monthly.

6. (10 points) Find the accumulated amount after 5 years if \$10,000 is invested at 7%/year (a) compounded continuously, (b) compounded yearly.

7. (5 points) Use the laws of logarithms to expand and simplify the expression.

$$\ln \frac{x^2(x+3)}{e^3}$$

8. (10 points) Find the derivative of the function.

(a) $f(x) = e^{-3x}$

(b) $g(x) = \ln(3x^2 - 1)$

9*. (a) (1 extra point) Is it true that $\frac{a+b}{a} = \frac{a+b}{a} = \frac{1+b}{1}$ for any b and $a \neq 0$?

(b) (5 extra points) Find the absolute minimum of the function $f(x) = \frac{e^x}{x^2}$ on $[1, 4]$.

Honor Code: *On my honor, I have neither received nor given any aid during this examination.*

Signature: _____