

Math 110: Algebra for Trig and Calculus
 Tuesday, October 17, 2017
 Exam 2 Fall 2017

Name: _____

Section: _____

Last 4 Digits of Student ID #: _____

This exam has twelve multiple choice questions (5 points each), five true/false questions (2 points each), and three free response questions (10 points each). Additional blank sheets are available for scratch work. No books or notes may be used. Turn off your cell phones and do not wear ear-plugs during the exam. You may use a calculator, but not one which has scientific or graphing capabilities.

On the multiple choice and true/false choice problems:

1. You must give your final answer in the multiple choice and true/false answer boxes on the front page of your exam. See the "EXAMPLE" row for a correct shading example.
2. Carefully check your answers. No credit will be given for answers other than those indicated in the answer boxes.

On the free response problems:

1. Write your solutions neatly in the space below the question (unsupported answers may not receive credit). You are not expected to write your solution next to the statement of the question.
2. Give exact answers, rather than decimal approximations (unless otherwise stated).

Multiple Choice Answers

EXAMPLE	A	B	C	D	E
Question					
1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E

True/False Choice Answers

Question		
13	T	F
14	T	F
15	T	F
16	T	F
17	T	F

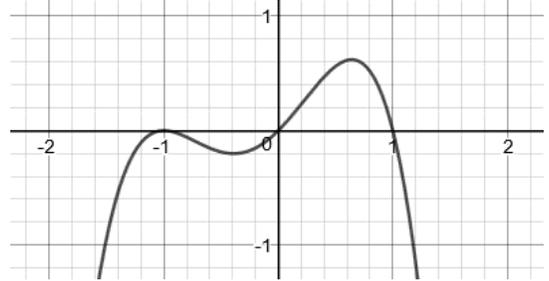
Exam Scores

Question	Score	Total
MC		60
TF		10
18		10
19		10
20		10
Total		100

Record the correct answer to the following problems on the front page of this exam.

1. The graph of a polynomial function is shown below. Determine whether its degree is even or odd and whether its leading coefficient is positive or negative.

- (a) Odd degree, positive leading coefficient
- (b) Odd degree, negative leading coefficient
- (c) Even degree, positive leading coefficient
- (d) Even degree, negative leading coefficient
- (e) None of the other choices.



2. Determine the vertex of the parabola $f(x) = -(x - \pi)^2 - \sqrt{3}$.

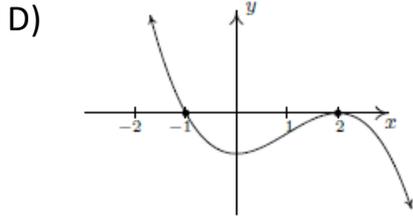
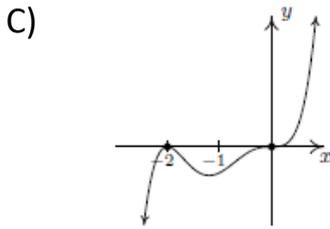
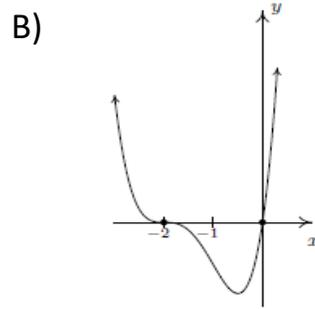
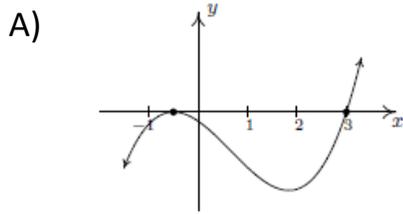
- (a) $(-\pi, -\sqrt{3})$
- (b) $(\pi, -\sqrt{3})$
- (c) $(\sqrt{3}, \pi)$
- (d) $(-\sqrt{3}, \pi)$
- (e) None of the other choices.

3. Compute the remainder when $x^7 - 15x^3 + 11$ is divided by $x + 2$.

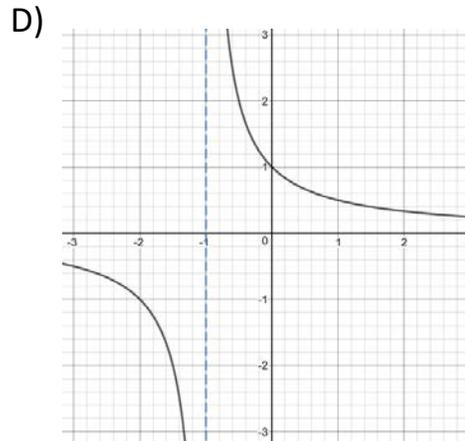
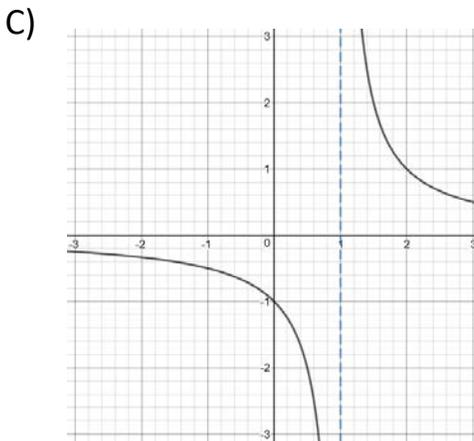
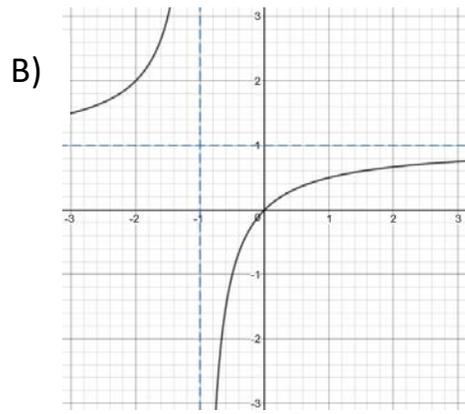
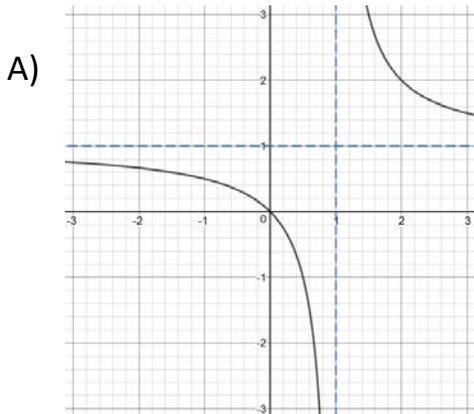
- (a) -15
- (b) 3
- (c) 19
- (d) 45
- (e) None of the other choices.

Record the correct answer to the following problems on the front page of this exam.

4. Which of the following graphs match the function $p(x) = x^3(x + 2)^2$?



5. Which of the following graphs match the function $f(x) = \frac{x}{x-1}$?



Record the correct answer to the following problems on the front page of this exam.

6. A company determines that the profit from selling x laptops is modeled by the function $P(x) = -x^2 + 120x - 2600$. How many laptops should be sold to maximum profit?
- (a) 60 laptops
 - (b) 120 laptops
 - (c) 1000 laptops
 - (d) 2600 laptops
 - (e) None of the other choices.
7. A bacterial culture begins with 4 cells and then triples each day later. Determine a function $N(t)$ for the number of cells in the culture t days later.
- (a) $N(t) = 3(4^t)$
 - (b) $N(t) = 4(3^t)$
 - (c) $N(t) = 3\left(\frac{1}{4^t}\right)$
 - (d) $N(t) = 4\left(\frac{1}{3^t}\right)$
 - (e) None of the other choices.
8. Convert the equation $3^2 = 9$ into logarithmic form.
- a) $\log_2(3) = 9$
 - b) $\log_9(2) = 3$
 - c) $\log_3(9) = 2$
 - d) $\log_9(3) = 2$
 - e) None of the other choices.

Record the correct answer to the following problems on the front page of this exam.

9. Evaluate the expression $\log_{64}(8)$.

- a) 0
- b) 1
- c) 2
- d) 3
- e) None of the other choices.

10. Which of the following expands the expression $\ln\left(\frac{\sqrt{x}}{y^3z}\right)$ as a sum/difference of multiples of logarithms?

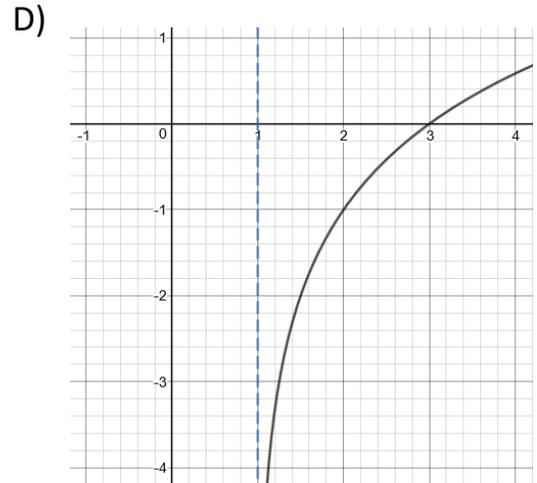
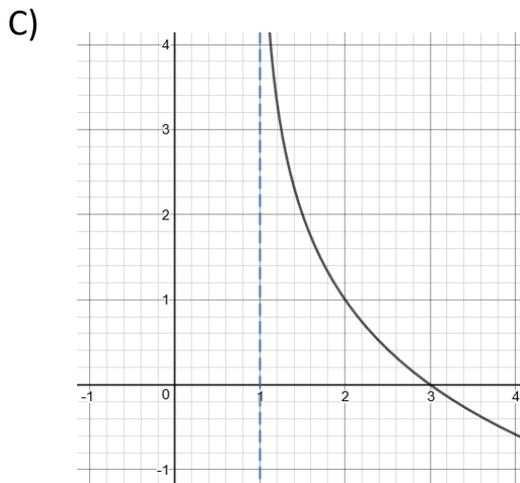
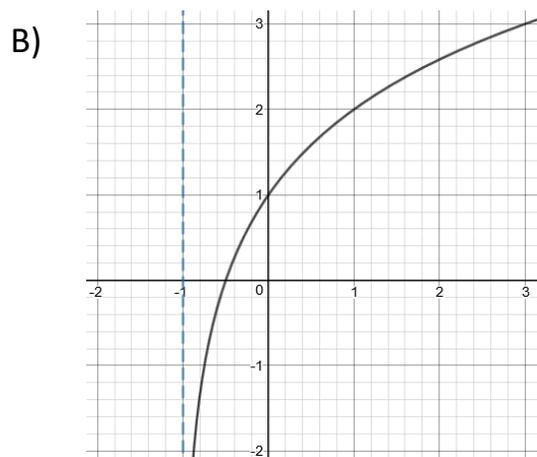
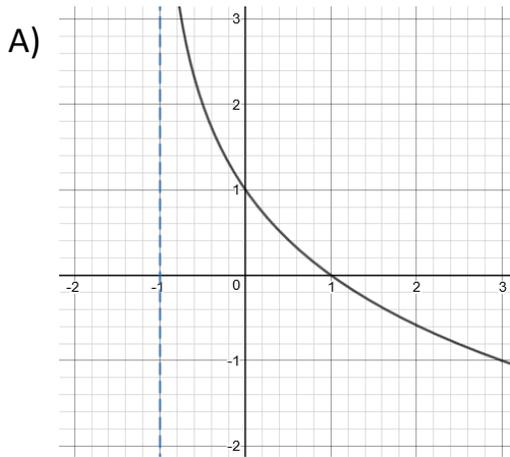
- a) $2 \ln(x) - 3 \ln(y) + \ln(z)$
- b) $\frac{1}{2} \ln(x) - 3 \ln(y) + \ln(z)$
- c) $\frac{1}{2} \ln(x) - 3 \ln(y) - \ln(z)$
- d) $2 \ln(x) - 3 \ln(y) - \ln(z)$
- e) None of the other choices.

11. Which of the following combines the expression $-3 \log(x) - 2 \log(y)$ as a single logarithm?

- a) $\log\left(\frac{1}{x^3y^2}\right)$
- b) $\log(x^3y^2)$
- c) $\log\left(\frac{x^3}{y^2}\right)$
- d) $\log\left(\frac{y^2}{x^3}\right)$
- e) None of the other choices.

Record the correct answer to the following problems on the front page of this exam.

12. Which of the following graphs match the function $f(x) = 1 - \log_2(x + 1)$?



For questions 13-17, determine whether each statement is true or false.

13. The remainder in polynomial division is 0 when the divisor is a factor of the dividend.

14. A polynomial of degree 3 always has exactly 3 real and distinct roots.

15. The domain of $f(x) = \log(x)$ is all real numbers.

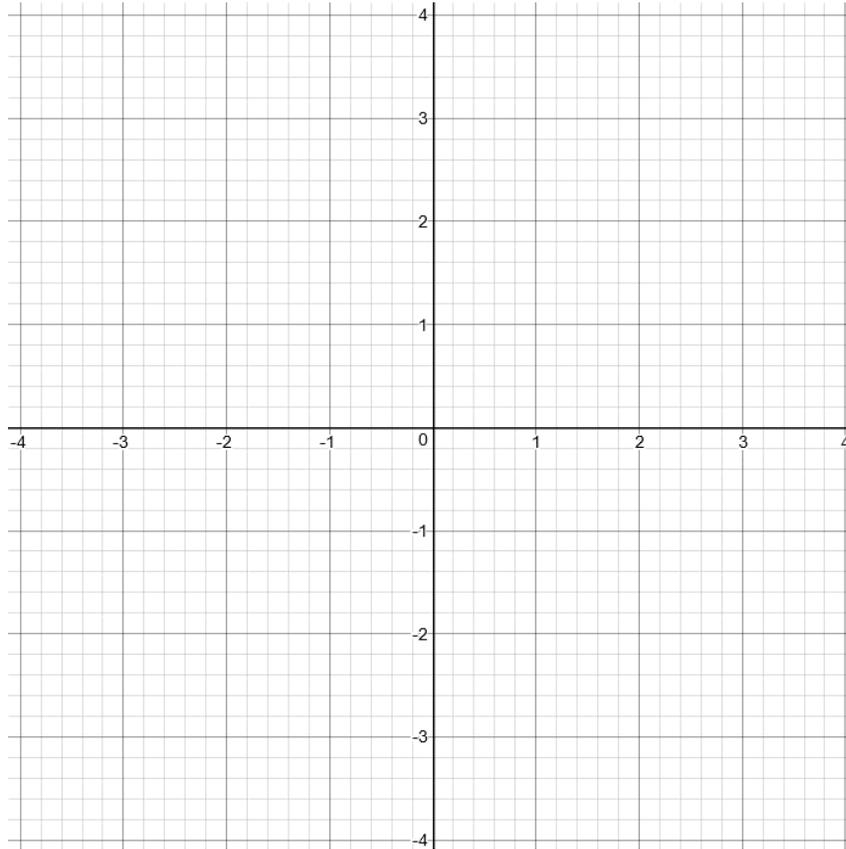
16. For all real numbers A and B : $\log(A + B) = \log(A) + \log(B)$

17. $\ln(0) = 1$

Free Response Questions: Show your work!!

18. Graph the following quadratic function. Compute the **coordinates** of the vertex and the x - and y -intercepts, if any exist. Also, determine the domain and range and write the answer in **interval notation**. Record your answers in the spaces provided below. (If no x - or y -intercepts exist, write NONE in the space provided.)

$$f(x) = 2x^2 - 4x - 1$$



Vertex Coordinates: _____

Domain: _____

x -intercept(s) Coordinates: _____

Range: _____

y -intercept Coordinates: _____

Free Response Questions: Show your work!!

19. Solve the following equation.

$$2500 = \frac{5000}{1 + 2e^{-3x}}$$

Free Response Questions: Show your work!!

20. Solve the following equation.

$$\log_3(x - 4) + \log_3(x + 4) = 2$$