

Name:

Recitation Instructor:

Recitation Day and Time:

Studio College Algebra – Exam 3 – April 2015

Directions: You will find 16 problems listed below. Each problem is worth 5 points. No notes/books/friends are allowed. Graphing calculator models above the level of a TI-84 plus are not allowed (in particular, calculators with a built in CAS and/or QWERTY keyboard are not allowed). You have one hour to complete this exam. **SHOW ALL WORK!**

1. Rewrite the following in exponential form: $\ln(x + 1) = 7$. Do not use your calculator.

2. Rewrite the following in logarithmic form: $2^{-4} = \frac{1}{16}$. Do not use your calculator.

3. If $\log(a) = 2.6$ and $\log(b) = 1.4$, find $\log\left(\frac{a^2}{\sqrt[5]{b}}\right)$.

4. What lump sum would need to be invested at an annual interest rate of 3%, under continuous compounding, for 6 years, in order to end up with \$4000? Round answer to the nearest cent.

5. Solve $5^{x-2} = 3$. Leave answer exact, i.e., do not use calculator.

6. Solve $3 \ln(2x - 5) - 1 = 11$. Leave answer exact, i.e., do not use calculator.

7. Given $f(x) = \log_3(x + 1)$, find $f^{-1}(x)$.

8. Find the domain of $f(x) = \log(25 - 7x)$.

9. The function $P(t) = 21.109 - 5.686 \ln(t + 1)$ describes the revenue, in thousands of dollars, for the sale of a product t weeks after an ad campaign for the product ended, where $0 \leq t \leq 10$. Find $P(6)$, round to the nearest cent, and interpret the meaning of $P(6)$ in a complete sentence.

10. What are all the real and complex zeros of $x^3 - 27$, given that one zero is $x = 3$?

11. What is the horizontal asymptote of the function $f(x) = e^x + 4$? Explain briefly how you arrived at your answer, using proper math vocabulary and grammar.

12. Find 2 different fourth degree polynomials, each having single roots at $x = -1$, $x = 3$ and a double root at $x = -3$. Do not multiply your answers out.

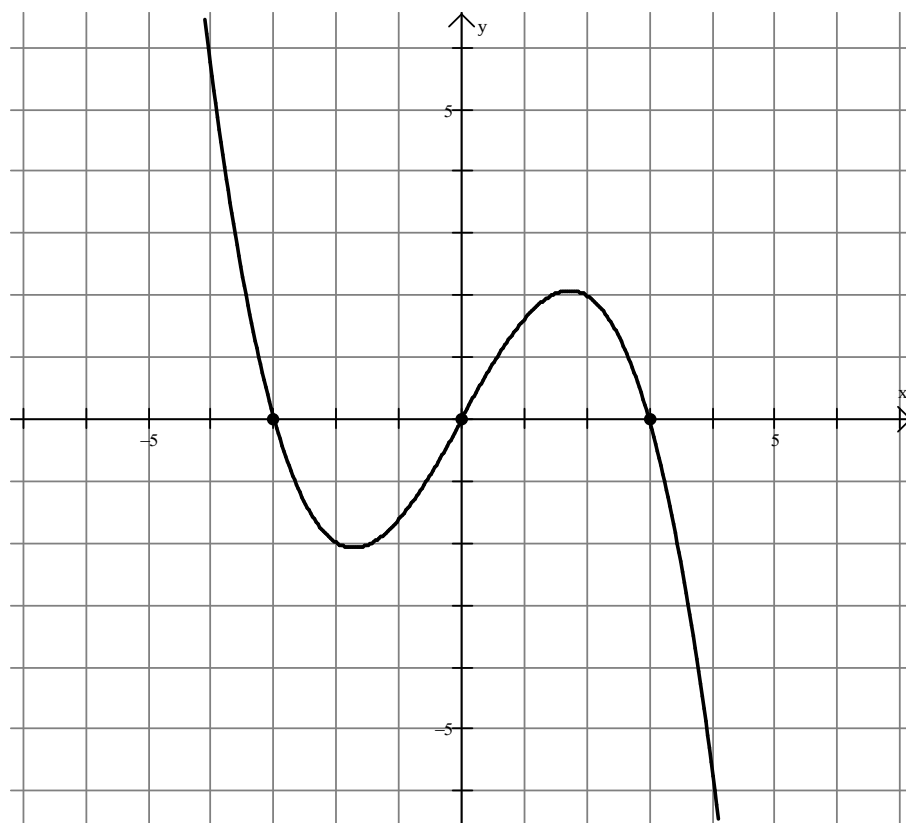
Answer 1:

Answer 2:

13. Given the revenue function $R(x) = 289x - x^3$, where x is a number of units, what numbers of units give zero revenue?

14. Given that $x = -2$ is a zero of the polynomial $p(x) = x^3 + 6x^2 + 21x + 26$, find all the other zeros, real or complex, of $p(x)$.

15. Given the graph of $f(x)$ below, answer TRUE or FALSE for the statements that follow.



- (a) $f(x)$ has even degree.
- (b) $f(x)$ has negative leading coefficient.
- (c) $f(x)$ has a positive constant term.
- (d) $f(x)$ is a one-to-one function.
- (e) As $x \rightarrow \infty$, $f(x) \rightarrow \infty$.

16. We discussed the general form of an exponential function in lecture: $g(x) = a^x$, where a is the base with $a > 0$ and $a \neq 1$. Answer the following questions:

- (a) For what values of a does $g(x)$ represent exponential growth?
- (b) For what values of a does $g(x)$ represent exponential decay?