31 May 2018 Name: .

Pre-Exam: Study guide questions

Answer in pen. Show work. Graph carefully using pencil.

1. Write $\sqrt[3]{x} \cdot \sqrt{x}$ as a single term with a rational exponent.

2. Explain how $\left(3^{\frac{1}{5}}\right)^2$ can be written as the equivalent radical expression $\sqrt[5]{9}$.

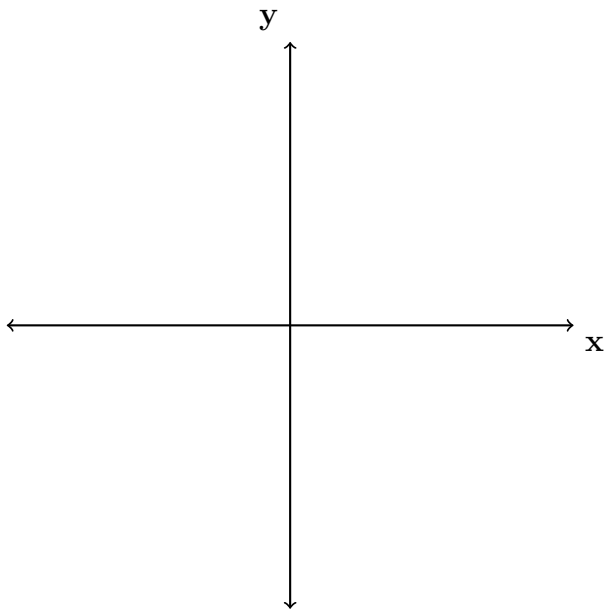
3. Given i is the imaginary unit, $(2 - yi)^2$ in simplest form is what?

4. What is the expression $6xi^3(-4xi + 5)$ is equivalent to?

Pre-Exam: Study guide questions

5. Sketch a graph of a cubic polynomial with the following characteristics:

   - three negative, real zeros
   - as $x \to +\infty$, $f(x) \to +\infty$
   - as $x \to -\infty$, $f(x) \to -\infty$

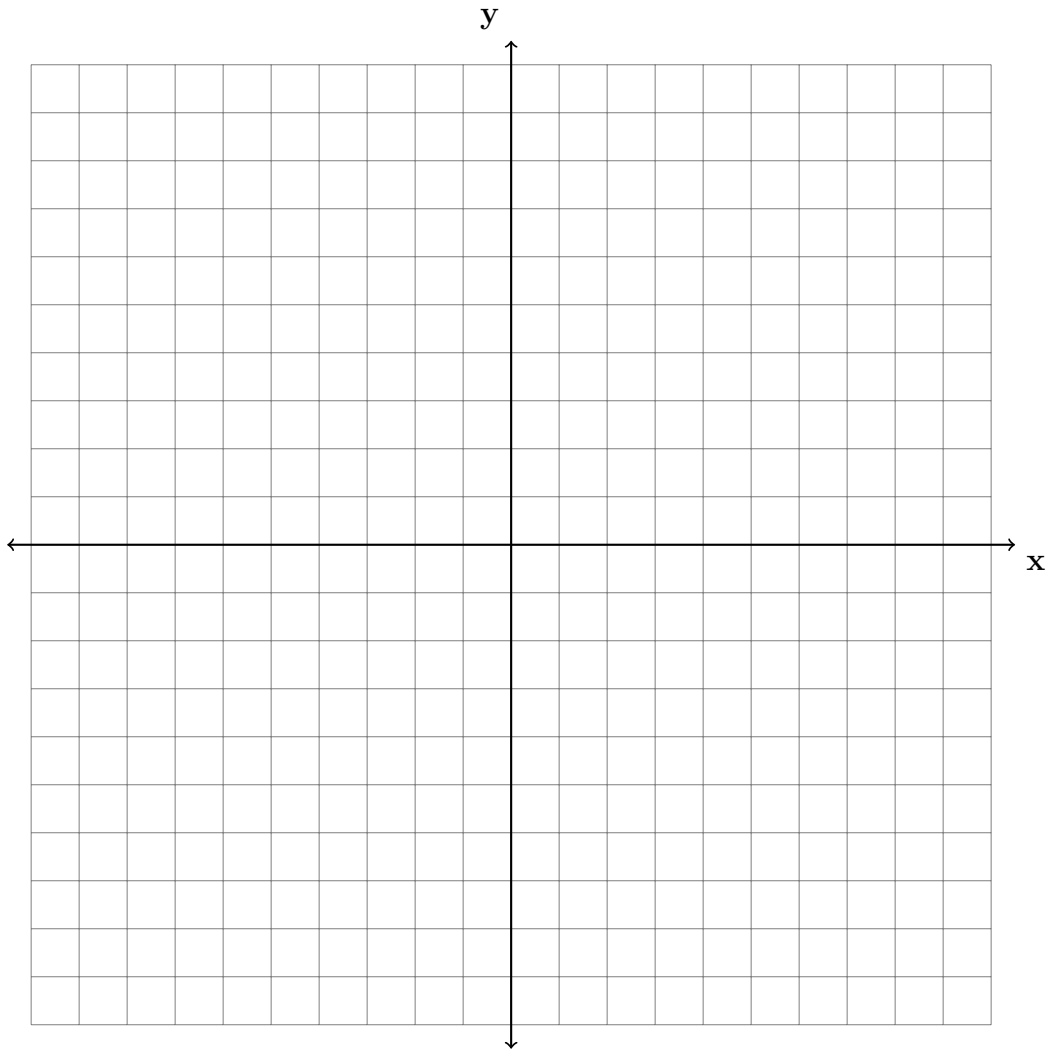


6. Given: $f(x) = 2x^2 + x - 3$ and $g(x) = x - 1$
   Express $f(x) \bullet g(x) - [f(x) + g(x)]$ as a polynomial in standard form.

Pre-Exam: Study guide questions

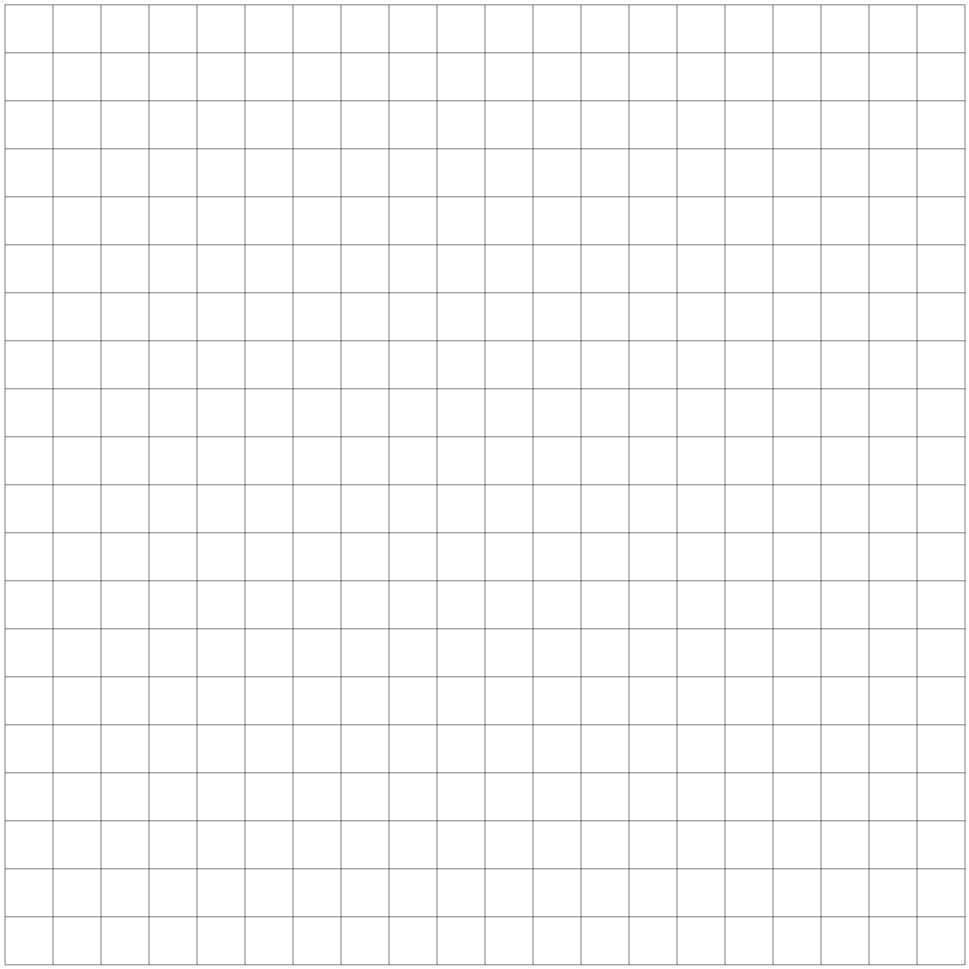
7. Find algebraically the zeros for $g(x) = x^3 - 2x^2 - 5x + 6$.

On the set of axes below, graph $y = g(x)$.



Pre-Exam: Study guide questions

8. On the grid below, sketch a cubic polynomial whose zeros are 1, 3, and -2.



Pre-Exam: Study guide questions

9. Given $f(x) = 3x^2 + 7x - 20$ and $g(x) = x - 2$, state the quotient and remainder of $\frac{f(x)}{g(x)}$, in the form $q(x) + \frac{r(x)}{g(x)}$.

10. Determine if $x - 5$ is a factor of $2x^3 - 4x^2 - 7x - 10$. Explain your answer.

Pre-Exam: Study guide questions

11. The function below models the average price of gas in a small town since January 1st.

$$G(t) = -0.0049t^4 + 0.0923t^3 - 0.56t^2 + 1.166t + 3.23, \text{ where } 0 \leq t \leq 10.$$

If $G(t)$ is the average price of gas in dollars and t represents the number of months since January 1st, the absolute maximum $G(t)$ reaches over the given domain is about what value, to the nearest cent?

12. A rabbit population doubles every 4 weeks. There are currently five rabbits in a restricted area. If t represents the time, in weeks, and $P(t)$ is the population of rabbits with respect to time, about how many rabbits will there be in 98 days?

Pre-Exam: Study guide questions

13. Researchers in a local area found that the population of rabbits with an initial population of 20 grew continuously at the rate of 5% per month. The fox population had an initial value of 30 and grew continuously at the rate of 3% per month.

    Find, to the *nearest tenth of a month*, how long it takes for these populations to be equal.

14. In New York State, the minimum wage has grown exponentially. In 1966, the minimum wage was \$1.25 an hour and in 2015, it was \$8.75. Algebraically determine the rate of growth to the *nearest percent*.

Pre-Exam: Study guide questions

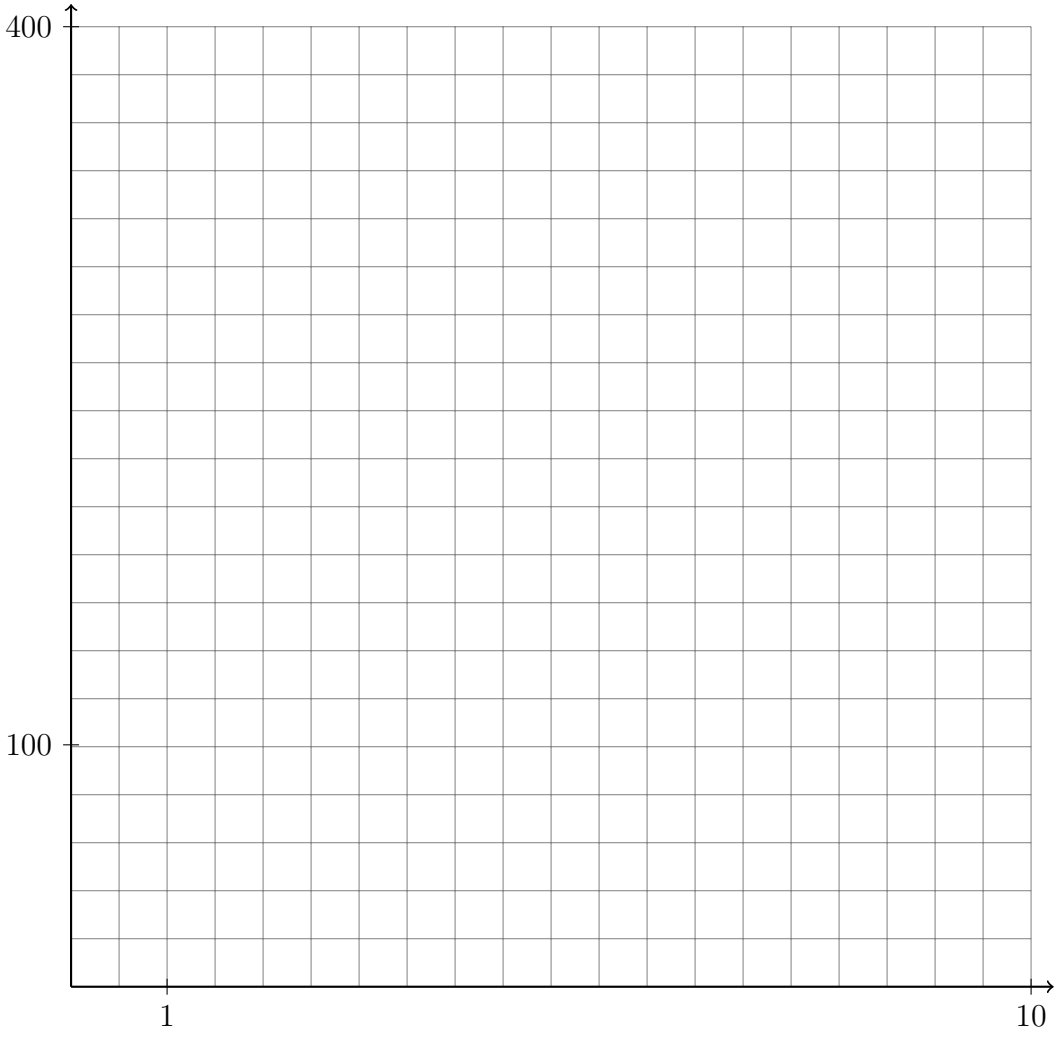
15. Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \cdot \dfrac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

    With no down payment, determine Jim's mortgage payment, rounded to the nearest dollar.

    Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be \$1100.

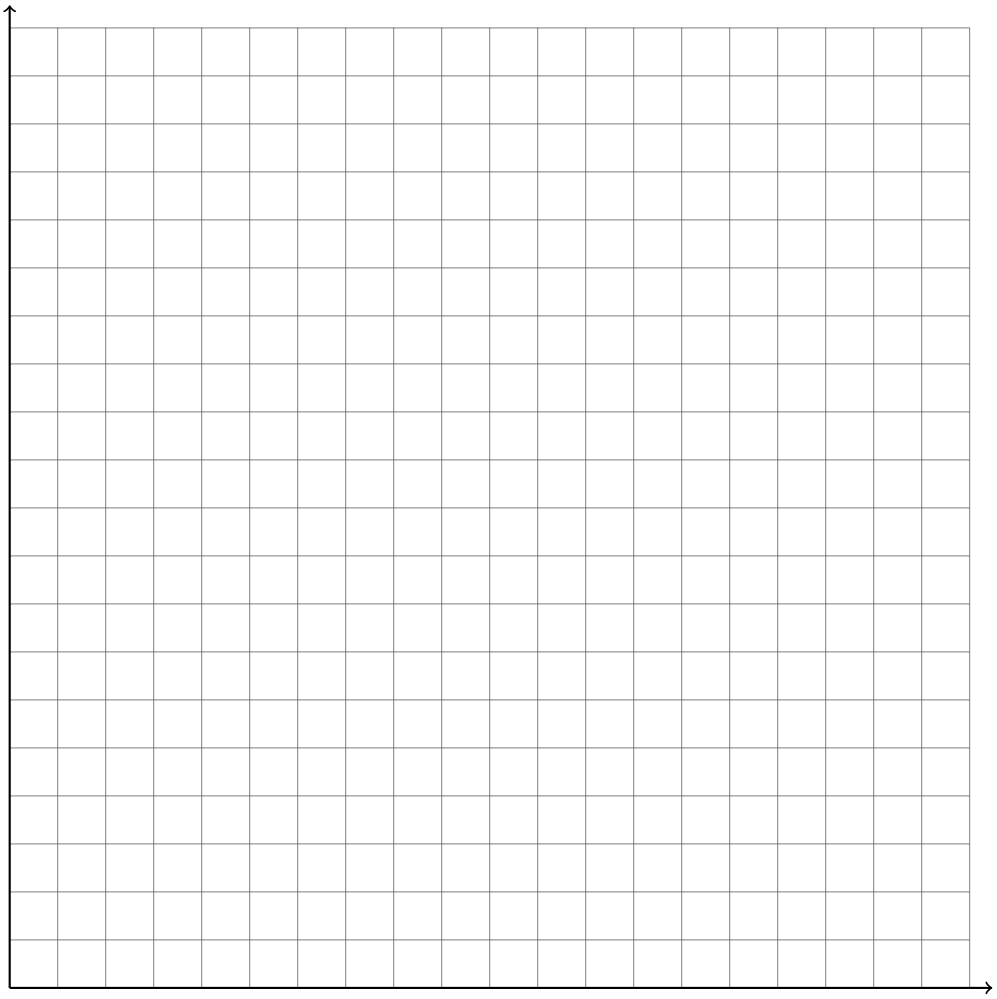
Pre-Exam: Study guide questions

16. Graph $y = 400(.85)^{2x} - 6$ on the set of axes below.



17. The value of a certain small passenger car based on its use in years is modeled by $V(t) = 28482.698(0.684)^t$, where $V(t)$ is the value in dollars and t is the time in years. Zach had to take out a loan to purchase the small passenger car. The function $Z(t) = 22151.327(0.778)^t$, where $Z(t)$ is measured in dollars, and t is the time in years, models the unpaid amount of Zach's loan over time.

    Graph $V(t)$ and $Z(t)$ over the interval $0 \leq t \leq 5$, on the set of axes below.



    State when $V(t) = Z(t)$, to the *nearest hundredth*, and interpret its meaning in the context of the problem.

Pre-Exam: Study guide questions

18. The probability that Gary and Jane have a child with blue eyes is 0.25, and the probability that they have a child with blond hair is 0.5. The probability that they have a child with both blue eyes and blond hair is 0.125. Given this information, the events blue eyes and blond hair are
    . I: dependent
    . II: independent
    . III: mutually exclusive

19. Data collected about jogging from students with two older siblings are shown in the table below.

	Neither Sibling Jogs	One Sibling Jogs	Both Siblings Jogs
Student Does Not Jog	1168	1823	1380
Student Jogs	188	416	400

    Using these data, determine whether a student with two older siblings is more likely to jog if one sibling jogs or if both siblings jog. Justify your answer.

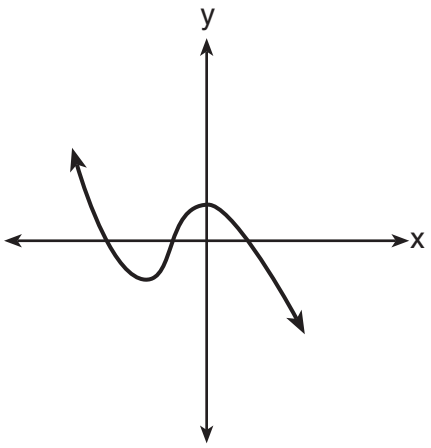
Pre-Exam: Study guide questions

20. The zeros for $f(x) = x^4 - 4x^3 - 9x^2 + 36x$ are

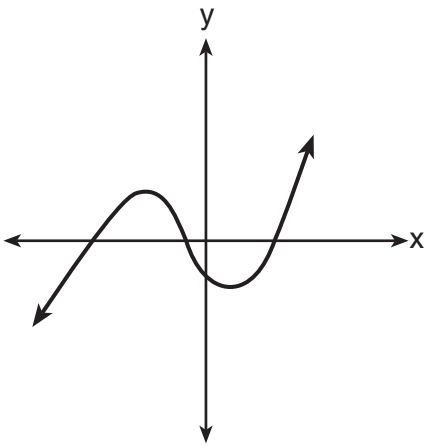
    (a) $\{0, \pm 3, 4\}$
    (b) $\{0, 3, 4\}$
    (c) $\{0, \pm 3, -4\}$
    (d) $\{0, 3, 4\}$

21. Which graph has the following characteristics?

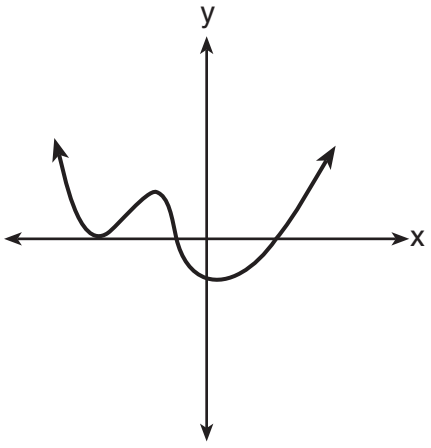
    - three real zeros
    - as $x \to -\infty$, $f(x) \to -\infty$
    - as $x \to \infty$, $f(x) \to \infty$



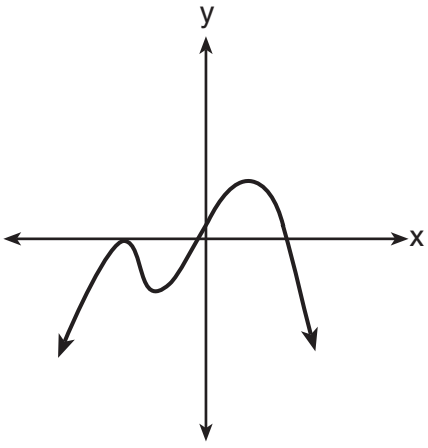
(1)



(3)

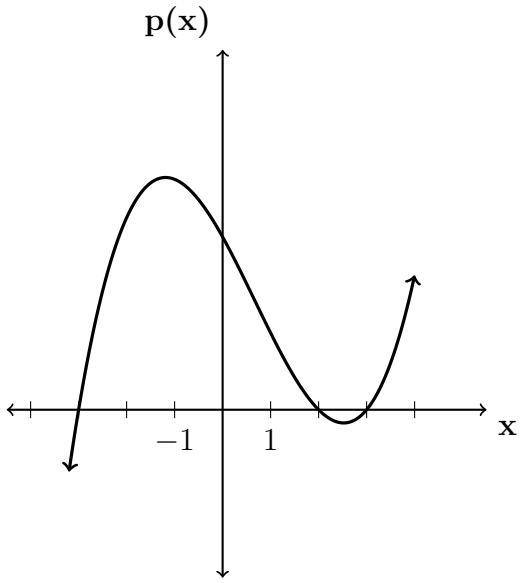


(2)



(4)

22. The graph of the function $p(x)$ is sketched below.



Which equation could represent $p(x)$?

(a) $p(x) = (x^2 - 9)(x - 2)$

(b) $p(x) = x^3 - 2x^2 + 9x + 18$

(c) $p(x) = (x^2 + 9)(x - 2)$

(d) $p(x) = x^3 + 2x^2 - 9x - 18$

23. When $g(x)$ is divided by $x+4$, the remainder is 0. Given $g(x) = x^4+3x^3-6x^2-6x+8$, which conclusion about $g(x)$ is true?

(a) $g(4) = 0$

(b) $g(-4) = 0$

(c) $x - 4$ is a factor of $g(x)$.

(d) No conclusion can be made regarding $g(x)$.

Pre-Exam: Study guide questions

24. The expression $\left(\frac{m^2}{m^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$ is equivalent to

    (a) $-\sqrt[6]{m^5}$

    (b) $\frac{1}{\sqrt[6]{m^5}}$

    (c) $-m\sqrt[5]{m}$

    (d) $\frac{1}{m\sqrt[5]{m}}$

25. An equation to represent the value of a car after t months of ownership is $v = 32,000(0.81)^{\frac{t}{12}}$. Which statement is *not* correct?

    (a) The car lost approximately 19% of its value each month.

    (b) The car maintained approximately 98% of its value each month.

    (c) The value of the car when it was purchased was \$32,000.

    (d) The value of the car 1 year after it was purchased was \$25,920.