

Algebra II Pre-AP

Review for Spring Semester Exam

Work all problems on notebook paper and check answers on Mr. Russell's web site.

Use a calculator ONLY on problems marked with a *.

1) Find the value of k such that $(x + 4)$ is a factor of $x^3 + kx^2 + kx - 2$.		
2) Find all intercepts of $P(x) = 2x^3 + 3x^2 - 18x - 27$. Describe the end behaviors using "As" statements. Then graph the function. Use a calculator to check your graph ONLY.		
3*) Use a calculator to find all rational zeros of $p(x) = 2x^4 - 5x^3 - 2x^2 + 11x - 6$. Then write the function as a product of linear factors.		
4*) Use a graphing calculator to find the open intervals over which the function $h(x) = x^3 + 5x^2 - 3x - 2$ is increasing and decreasing.		
5) Write a polynomial equation of lowest degree with relatively prime integer coefficients having roots -2 and $-2 + \sqrt{5}$.		
6) Solve $x^4 - 6x^3 + 8x^2 - 24x + 16 = 0$ given that $2i$ is a root.		
7*) A manufacturer has a piece of tin that is 15 in wide and 20 in long. An open box is to be made by cutting squares from each corner of the tin and folding up the sides.		
a) Write a function that expresses V , the volume of the box in terms of x , the length of the side of the square to be cut out. You may leave your function factored (i.e., don't multiply it out.)		
b) What is the domain of V ?		
c) Find the length x that should be cut out that would maximize the volume of the box.		
d) What size square should be cut from each corner to produce a box with volume of 180 in^3 ?		
8) Solve $27^{x+3} = 9^{2x-1}$	9) Solve $25x^{-2/3} = 49$	10) Solve $49^{x-2} = 7\sqrt{7}$
11) Write the equation of the exponential function $f(x) = ab^x$ that has a base of 3 and passes through $(2,1)$.		
12) Simplify $\log_{16} \sqrt[4]{\frac{1}{8}}$	13) Simplify $\log_{81} 3\sqrt{3}$	14) Solve $\log_{2x} 27 = 3$
15) Write $\frac{1}{2}\log_2 x - 3\log_2 y + 3$ as the logarithm of a single expression.		
16) Write $\log \frac{10xy^2}{7z}$ in expanded form.	17) Solve $\log_2(x+3) - \log_2(x+1) = 3$	
18) Solve $5^{2x} = 10^{x+2}$. Give an exact answer using natural logarithms.	19) Solve $e^{2x} - 3e^x = 10$.	
20*) The deer population at the local reserve grows exponentially. The population in year 0 is 125 deer and the population in year 2 is 150 deer.		
a) Find a function using base e that models the deer population after t years.		
b) Find the number of years required for the deer population to be 400.		
21) State the domain of $f(x) = \frac{3x}{3x^2 - 5x - 2}$	22) Simplify $\frac{x^3 - 3x^2 + 4x - 12}{x^3 - 3x^2 - 4x + 12}$	
Simplify #23 - 28		
23) $\frac{3p+6}{9p} * \frac{12p}{p^2-4} \div \frac{18p^3}{2p-4}$	24) $\frac{6y^2+13y+6}{4y^2-9} \div \frac{6y^2+y-2}{4y^2-1}$	25) $\frac{x+2}{2x-2} + \frac{2x+1}{x^2-4x+3}$
26) $\frac{x}{x^2-5x+6} - \frac{1}{x^2-x-2}$	27) $\frac{x^{-1}+y^{-1}}{(x+y)^{-1}}$	28) $\frac{5}{x-1} - \frac{2}{x+1}$ $\frac{x}{x-1} + \frac{1}{x+1}$
Solve #29 - 30		
29) $\frac{t^2}{6} + \frac{t-2}{4} \geq \frac{t+1}{3}$	30) $\frac{x}{x+3} + \frac{1}{x-3} = 1$	
31*) If y varies directly as x and inversely as the square of z find the percent by which y increases or decreases when x and z are both increased by 20%.		

For #32 - 34, find all asymptotes and intercepts. Then graph on graph paper. Check your graphs on a calculator.		
32) $y = \frac{x^2 - x - 6}{x^2 + 3x}$	33) $y = \frac{5x}{x^2 + 4}$	34) $y = \frac{x^2 + 5x + 4}{x - 3}$
35) Find and simplify an expression for the average rate of change from x to $(x + h)$ for $f(x) = 2x^2 - 3x + 7$. Then use your answer to find the average rate of change on the interval $[-1, 3]$	36) Find and simplify an expression for the average rate of change from x to c for the function $g(x) = x^3 - 7x$. Then use your answer to find the average rate of change on the interval $[-1, 2]$.	
37) Write the equation of the circle whose diameter has endpoints with coordinates $(-7, 4)$ and $(-1, 10)$.		
38) Write $9x^2 + y^2 + 18x - 6y + 9 = 0$ in completed-square form. Graph the curve and state the coordinates of the foci.		
39) Write $x^2 - 4y^2 - 2x - 16y - 11 = 0$ in completed-square form. Graph the curve and state the coordinates of the foci and the equations of the asymptotes.		
40) Write $y^2 + 6x - 6y + 21 = 0$. In completed-square form. Then state the coordinates of the focus and the equation of the directrix.		
For #41 - 43, write in standard form the equation of each conic section described.		
41) Hyperbola with foci $(-5, 3)$ and $(9, 3)$ and difference of focal radii is 6.	42) Ellipse with foci $(-5, 1)$ and $(3, 1)$ and sum of focal radii is 16	43) Parabola with Focus $(-2, 1)$, vertex $(-2, -\frac{1}{2})$
Simplify #44 - 46		
44) $\frac{80!}{77!}$	45) ${}_n P_2$	46) ${}_n C_2$
47*) Three door prizes are to be given to 3 people in a crowd of 100. a) If the three prizes are identical, in how many ways can this be done? b) If the three prizes are different (1 st , 2 nd , and 3 rd), in how many ways can this be done?		
48*) A 5-person committee is to be selected from 10 teachers and 6 students, and you are one of the students. In how many different ways can the committee be chosen if:		
a) all are equally eligible	b) there must be 3 teachers and two students	c) teachers must outnumber students
d) the committee includes you		e) the committee does not include you
49*) The probability that project Alpha will succeed is 60%, the probability that project Beta will succeed is 45%, and the probability that project Gamma will succeed is 70%. Find each probability: a) all three will fail b) Alpha will succeed and the other two will fail c) at least one will succeed		
50*) A town council consists of 8 Democrats, 7 Republicans, and 5 Independents. A committee of 3 is chosen by randomly pulling names from a hat. What is the probability that the committee has: a) 2 Democrats and 1 Republican? b) 3 Independents? c) no Independents? d) one from each party? e) all three from the same party?		
51*) Out of 200 students in a senior class, 113 students are either varsity athletes or on the honor roll. There are 74 seniors who are varsity athletes and 51 seniors who are on the honor roll. Draw a Venn Diagram and find the following probabilities that a randomly selected senior: a) is on the honor roll. b) is a varsity athlete but not on the honor roll c) is both a varsity athlete and on the honor roll d) is neither a varsity athlete nor on the honor roll.		
For #52 - 53, find and simplify the specified term in each expansion.		
52*) The middle term in $(2x^2 - 3)^{10}$	53*) The term containing b^{15} in $(a^2 + 3b^3)^{11}$	
54*) A certain basketball player makes 78% of all of her free throw shots (FTs), assuming that her chance of making each FT is independent of the other shots. In a certain game she has 5 FTs. a) Let X = the number of FTs she makes. Find the probability distribution for X . b) Find the probability that she makes 4 or more FTs. c) Find the probability that she makes less than 2 FTs.		