

Name _____

Summer Assignment for Students Entering Calculus

Directions:

- Complete this assignment **WITHOUT** the use of a calculator.
- All work must be shown to receive credit.
- Write answers in the space provided.
- Complete this assignment before the first day of class and be ready to hand it in, fully complete, on the first day of class.

Note to the Student:

The purpose of this assignment is to review topics that are essential to your success in Precalculus. It will be assumed that all of the topics covered in this assignment, and in your previous math courses, have been mastered and will not need explanation as we use them in the calculus course.

Please make sure that you complete this assignment no earlier than a month before school starts. You want to make sure to give yourself time to identify and relearn concepts you have difficulty with but you don't want to do it too early in the summer that you forget the material.

This assignment will have some weight in your first quarter grade, to be determined by the teacher of your class.

We hope you have a great summer and look forward to seeing you in the fall!

The Birch Math Department

Simplifying, Multiplying and Dividing Rational Expressions

Simplify the following expressions

1) $\frac{x^2 + 2x - 15}{x^2 - 2x - 3}$

2) $\frac{2x^2 + 5x - 12}{3x^2 + 13x + 4}$

3) $\frac{9 - 4x^2}{8x^3 - 10x^2 - 3x}$

4) $\frac{x^3 - 8}{x^2 - 6x + 8}$

$$5) \frac{x^4 + x^2 - 20}{x^2 + 4x + 4}$$

$$6) \frac{8x^3 + 20x^2 - 12x}{4x^4 + 14x^3 + 6x^2}$$

Find the product. Write your answer in simplest form.

$$7) \frac{6x^2y^3}{2x^2y^2} \cdot \frac{10x^3y^4}{18y^2}$$

$$8) \frac{9x^3y}{3x^2y^3} \cdot \frac{12x^4y^5}{27y^2}$$

$$9) \frac{3x - 27x^3}{3x^2 - 2x - 1} \cdot \frac{3x^2 - 4x + 1}{3x}$$

$$10) \frac{4x - 2x^2}{x^2 - 5x + 6} \cdot \frac{x^2 - 4x + 3}{2x}$$

$$11) \frac{x + 2}{27x^3 + 8} \cdot (9x^2 - 6x + 4)$$

$$12) \frac{x - 3}{64x^3 - 1} \cdot (16x^2 + 4x + 1)$$

Find the quotient. Write your answer in simplest form.

13) $\frac{3}{4x-8} \div \frac{x^2+3x}{x^2+x-6}$

14) $\frac{8x^2+10x-3}{4x^2} \div (4x^2-x)$

15) $\frac{6x^2+7x-3}{x-1} \div (3x-1)$

16) $(x^2+6x-27) \div \frac{3x^2+27x}{x+5}$

Simplify the expression.

$$17) \frac{x}{x-2} \cdot (2x+3) \div \frac{4x^2-9}{x-2}$$

$$18) \frac{x}{x+3} \cdot (4x+1) \div \frac{16x^2-1}{x+3}$$

$$19) \frac{10x^2y}{x^2+xy} \cdot \frac{(x+y)^2}{2x} \div \frac{x^2-y^2}{5y^2}$$

$$20) \frac{x^2+2x}{x^2+2x-15} \cdot \frac{2x-6}{4} \div \frac{x^2+x-2}{x^2+4x-5}$$

Fractional Exponents and Exponential Equations

Write the expression in exponential form.

21) $\sqrt[4]{x}$

22) $-\sqrt{x}$

23) $\sqrt[5]{x^6}$

Write the expression in radical form.

24) $x^{\frac{1}{5}}$

25) $-x^{\frac{2}{3}}$

26) $x^{\frac{4}{3}}$

27) $x^{-\frac{3}{7}}$

Simplify each of the following.

28) $343^{\frac{5}{3}}$

29) $128^{-\frac{5}{3}}$

30) $-36^{\frac{5}{2}}$

31) $81^{-\frac{1}{3}}$

32) $\sqrt[4]{x} \cdot x^{\frac{3}{2}}$

33) $x^5 \cdot x^{\frac{5}{6}}$

Solve each of the following equations.

34) $x^{\frac{2}{3}} = 16$

35) $x^{\frac{5}{3}} = -32$

36) $2x^{\frac{2}{3}} = 72$

37) $4x^{\frac{2}{3}} - 4 = 60$

38) $-2(x-1)^{\frac{5}{3}} + 4 = -60$

39) $3(2x-3)^{\frac{5}{3}} - 3 = 381$

40) $x^{-\frac{3}{5}} = 343^{-1}$

41) $(x-1)^{-\frac{3}{2}} = \frac{1}{81}$

Factoring and Solving Polynomial Equations

Find the product.

42) $2x(x+3)(2x-4)$

43) $(x-1)(3-4x)(x^2+2)$

44) $(4x-3)^2$

45) $(5x-6)^3$

Factor the polynomial completely.

46) $x^3 + 729$

47) $64x^3 - 125$

48) $2x^3 + 16$

49) $-5x - 40x^4$

50) $16x^4 - 81$

51) $3x^5 - 48x$

52) $x^3 + 2x^2 - 49x - 98$

53) $4x^3 - 24x^2 - x + 6$

54) $-2x^4 - 10x^3 - 2x - 10$

55) $x^6 + x^5 - x^4 - x^3$

Solve each of the following equations for the real number solutions.

56) $x^4 - 6x^2 - 27 = 0$

57) $x^8 + 8x^4 - 9 = 0$

58) $-20x^3 + 8x^5 - 30x = 8x^3 + 30x$

59) $3x^6 + 10x^3 + 10 = 7$

60) $2x^7 + 7x^4 + 3x = 0$

61) $(3x+2)^3((-2x^2+4)^3+8)^2=0$

62) $-x^2 + 16x - 64 = 0$

63) $-x(x-9)(x+3) + 6x^2 = 12x^2$

Writing Equations of Lines in point-slope form

64) Write the equation of the line through the points $(-3,2)$ and $(-7,-3)$.

65) Write the equation of the line through the point $(-2,6)$ that is parallel to the line with equation $y + 4 = -2(x - 5)$.

66) Write the equation of the line through the point $(-3,-2)$ that is perpendicular to the line that goes through the points $(-4,6)$ and $(5,2)$.

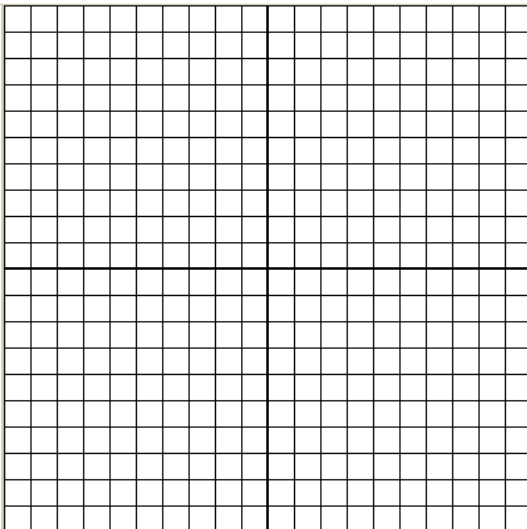
67) Write the equation of the line perpendicular to the line $y = 3$ that goes through the point $(-4,1)$.

68) Write the equation of the line parallel to the line $x = 5$ that goes through the points $(-2,9)$.

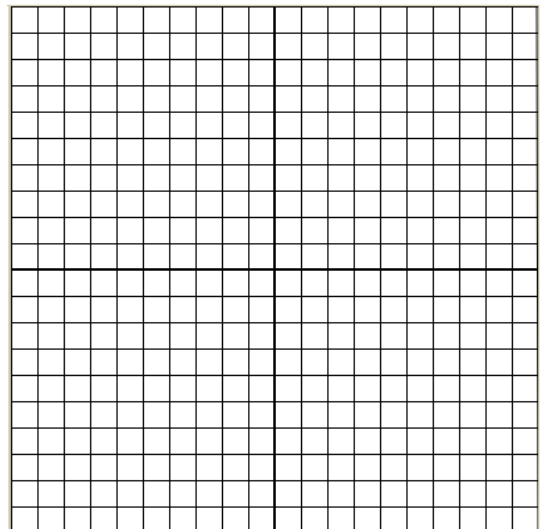
Graphing Piecewise Functions

Graph each function.

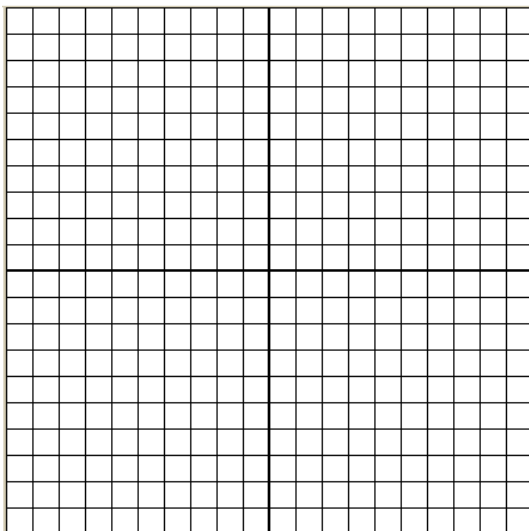
$$69) f(x) = \begin{cases} -3x + 4, & x < 2 \\ 2x - 6, & x \geq 2 \end{cases}$$



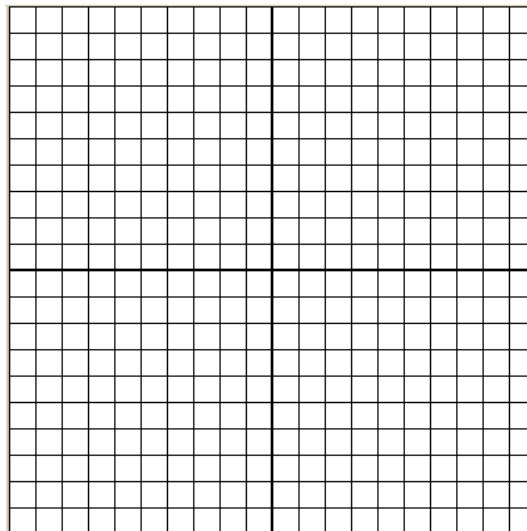
$$70) f(x) = \begin{cases} \frac{1}{2}x, & x > -4 \\ -2x - 4, & x \leq -4 \end{cases}$$



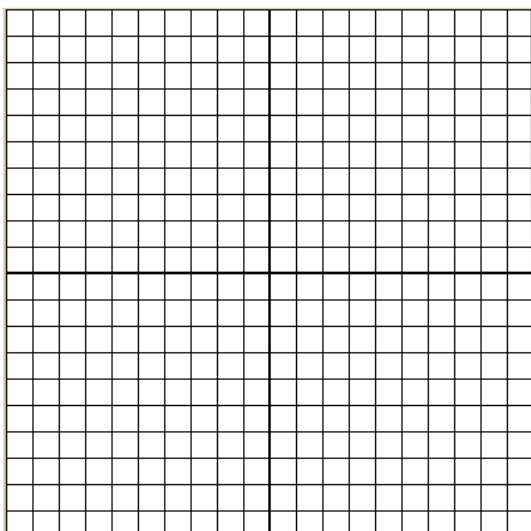
$$71) f(x) = \begin{cases} x+4, & x > 1 \\ x-6, & x < 1 \end{cases}$$



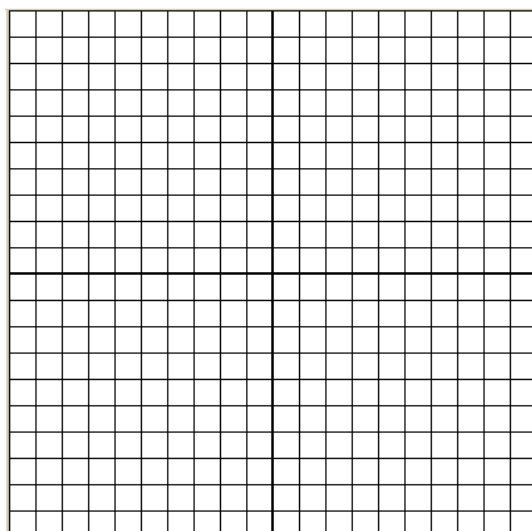
$$72) f(x) = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$



$$73) f(x) = \begin{cases} -4, & x < 2 \\ x-3, & x \geq 2 \end{cases}$$



$$74) f(x) = \begin{cases} 2x-4, & x \leq -2 \\ 3x+1, & x > -2 \end{cases}$$



Evaluating the Difference Quotient

Evaluate the difference quotient, $\frac{f(x+h) - f(x)}{h}$ for the given function.

75) $f(x) = x - 3$

76) $f(x) = x^2$

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

78) $f(x) = 2x^3 - 3x^2 + 5x$

Rationalizing Denominators

Rationalize the denominator.

79) $\frac{4}{\sqrt{5}}$

80) $\frac{6}{\sqrt{2}-3}$

Unit Circle and Trigonometry

Evaluate each of the following without a calculator.

81) $\sin\left(\frac{\pi}{3}\right)$

82) $\cos\left(\frac{5\pi}{6}\right)$

83) $\sin\left(-\frac{\pi}{4}\right)$

84) $\cos\left(\frac{\pi}{2}\right)$

85) $\sin^{-1}\left(\frac{1}{2}\right)$

86) $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

87) $\cos^{-1}(-1)$

88) $\tan^{-1}(-1)$

89) $\sin^{-1}(0)$

**** You should also review what the basic graphs of absolute value, polynomial, sine and cosine functions look like.**

Honors Calculus Summer Assignment Answer Sheet

Write your final answer for each problem on this sheet. You will not get credit for a correct answer if it is not written on this sheet.

1) _____ 13) _____ 25) _____

2) _____ 14) _____ 26) _____

3) _____ 15) _____ 27) _____

4) _____ 16) _____ 28) _____

5) _____ 17) _____ 29) _____

6) _____ 18) _____ 30) _____

7) _____ 19) _____ 31) _____

8) _____ 20) _____ 32) _____

9) _____ 21) _____ 33) _____

10) _____ 22) _____ 34) _____

11) _____ 23) _____ 35) _____

12) _____ 24) _____ 36) _____

Honors Calculus Summer Assignment Answer Sheet

37) _____ 50) _____ 63) _____

38) _____ 51) _____ 64) _____

39) _____ 52) _____ 65) _____

40) _____ 53) _____ 66) _____

41) _____ 54) _____ 67) _____

42) _____ 55) _____ 68) _____

43) _____ 56) _____ 69) _____

44) _____ 57) _____ 70) _____

45) _____ 58) _____ 71) _____

46) _____ 59) _____ 72) _____

47) _____ 60) _____ 73) _____

48) _____ 61) _____ 74) _____

49) _____ 62) _____ 75) _____

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76) _____ 81) _____ 86) _____

77) _____ 82) _____ 87) _____

78) _____ 83) _____ 88) _____

79) _____ 84) _____ 89) _____

80) _____ 85) _____