Math 10350 – Example Set 01A
Functions Review: Sections 1.1, 1.2, & 1.3

Algebra Review - Arithmetic Rules & Laws of Exponent

Complete the Arithmetic Operations below:

$a(b+c) =$

$\dfrac{a}{b} + \dfrac{c}{d} =$

$a \times b =$

$a(bc) =$

$\dfrac{a+b}{c} =$

$\dfrac{a}{b} \times \dfrac{c}{d} =$

$a \div \dfrac{b}{c} =$

$\dfrac{\frac{a}{b}}{\frac{c}{d}} =$

$(a+b)(c+d) =$

$(a+b)(a-b) =$

$(a+b)^2 =$

$(a-b)^2 =$

Complete the Laws of Exponents below:

$a^m \cdot a^n =$

$(ab)^m =$

$\dfrac{a^m}{a^n} = \quad ; a \neq 0$

$a^0 = \quad ; a \neq 0$

$a^{1/m} =$

$\left(\dfrac{a}{b}\right)^m = \quad ; b \neq 0$

$\dfrac{1}{b^m} =$

$(a^m)^n =$

1. A lab technician has 700 kg of salt and wishes to make a solution with concentration 5.6 g/cm^3. How much water in m^3 must he use to make the solution if all 700 kg of salt is used? (Ans: 0.125m^3)

2. Simplify $\sqrt{25a^4b^3} \times \frac{2}{b^2} \div \frac{5a^3}{b^2}$ giving your answer in the form ka^mb^n.

3. Give the lowest common denominator of fractions or rational functions in the sums below then evaluate the sum giving your answer as a single rational number or function with no common factors between its numerator and denominator.

a. $\frac{3}{5} - \frac{7}{15} + \frac{2}{9}$

b. $\frac{3}{x^2} - \frac{x}{x^2-4} - \frac{2}{x^2+2x}$

4. Simplify the following expression giving your answer in the form $\frac{p(x)}{q(x)}$ where $p(x)$ and $q(x)$ has no common factors.

$$\frac{(x^2+2)^3 \cdot 4 - (4x+1) \cdot 3(x^2+2)^2 \cdot 2x}{(x^2+2)^6}$$

Math 10350 – Example Set 01B
Functions Review: Sections 1.1, 1.2, & 1.3

(Basic Functions) Give an example for each type of basic functions below and give their general form:

A. Power Function:

An example: ____________________

General form: ____________________

B. Polynomial Function:

An example: ____________________

General form: ____________________

Special Cases

Linear functions: ____________________

Quadratic functions: ____________________

C. Rational Function:

An example: ____________________

General form: ____________________

D. Exponential Function:

An example: ____________________

General form: ____________________

E. Logarithmic Function:

An example: ____________________

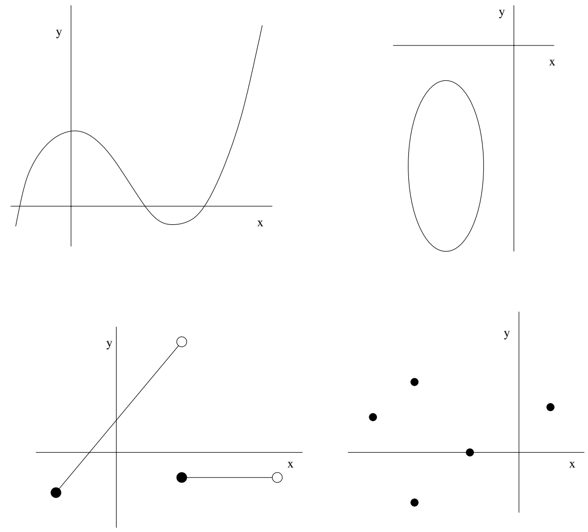
General form: ____________________

F. Trigonometric Function:

Examples:

Definition A **function** is a rule that assigns a value x (in the domain) to a (single) value y (in the range).

1. The quantity y relates to x in each of the following graphs. For each graph determine whether y is a function of x.



Price, Revenue, Cost & Profit. Write an equation that connects the revenue from the sale of a certain product, the number of the product sold (or demand), and selling price of one unit of the product. How does revenue differ from the profit from the sale of the product?

2. (An application of Functions) A electronic company decides to set the sale price of a sound card at \$60 a piece for a monthly demand of 100 pieces. The sale price drops to \$50 a piece for a monthly demand of 200 pieces.

2a. Assuming that the sale price for one sound card is a linear function of the size of the monthly demand, find a formula for the sale price s dollars per sound card in terms of the size x of the monthly demand. What is the revenue function from the sales of the sound card? $\left(-\frac{x}{10}+70; -\frac{x^2}{10}+70x\right)$

2b. Suppose further that the company has a monthly overhead cost of \$5000 for producing the sound cards and a cost of \$10 for producing each piece of the sound card. What is the monthly profit from the sales of the sound card in terms of month production assuming that all items produced are sold? $\left(-\frac{x^2}{10}+60x-5000\right)$

3. (Composition of Functions) Let $f(x) = \dfrac{x+1}{x-2}$ and $g(x) = \dfrac{2}{x+1}$. Evaluate the following (a) $\dfrac{f(a+h)-f(a)}{h}$ and (b) $f(g(a))$ simplify your answer assuming that $a \neq -1$.

Completing the Square Notes

Completing the square is an algebraic process applied to quadratic expressions of the form $x^2 + ax$ to obtain a perfect square. Specifically we want to find a positive number b such that

$$x^2 \quad + \quad ax \quad + \quad \underline{\hspace{3cm}} \quad = \quad \underline{\hspace{6cm}}$$

where both b and c are to be determined.

Geometric interpretation of completing the square.

Interpret x^2 as the area of a ____________________ and

Interpret ax as the area of ____________________ ____________________

Piece together the square and rectangles together to see the method of completing the square.

Examples. Fill in the blanks for each quadratic expressions of the form $x^2 + ax$ below to obtain a perfect square.

(a) $x^2 \quad + \quad 6x \quad + \quad \underline{\hspace{3cm}} \quad = \quad \underline{\hspace{6cm}}$

(b) $x^2 \quad - \quad 4x \quad + \quad \underline{\hspace{3cm}} \quad = \quad \underline{\hspace{6cm}}$

(c) $x^2 \quad + \quad 5x \quad + \quad \underline{\hspace{3cm}} \quad = \quad \underline{\hspace{6cm}}$

3. (Completing the Square Practice) Rewrite each of the following quadratic functions in the form $A(x+B)^2 + C$: **(i)** $x^2 - 6x - 5$, **(ii)** $-2x^2 - 8x + 1$. **(iii)** Graph the quadratic function in (ii). State the coordinates of the vertex and the **equation** of the axis of symmetry.

4. Rewrite the monthly profit function in Q1 in the form $A(x+B)^2 + C$.

a. By scaling and translating x^2, graph the monthly profit function labelling the axis of symmetry, vertical intercept and vertex.

b. What is the maximum profit the company can make and when does that happen?