

# MAT 1033 and IDS 2391 Formula Sheet

## Arithmetic Operations

$$ab + ac = a(b + c) \quad a\left(\frac{b}{c}\right) = \frac{ab}{c}$$

$$\frac{\left(\frac{a}{b}\right)}{c} = \frac{a}{bc}$$

$$\frac{a}{\left(\frac{b}{c}\right)} = \frac{ac}{b}$$

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

$$\frac{a}{b} - \frac{c}{d} = \frac{ad - bc}{bd}$$

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

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

$$\frac{ab+ac}{a} = b+c, \quad a \neq 0$$

$$\frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)} = \frac{ad}{bc}$$

## Exponent Properties

$$a^n a^m = a^{n+m}$$

$$\frac{a^n}{a^m} = a^{n-m} = \frac{1}{a^{m-n}}$$

$$(a^n)^m = a^{nm}$$

$$a^0 = 1, \quad a \neq 0$$

$$(ab)^n = a^n b^n$$

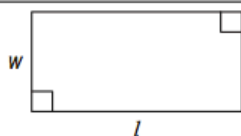
$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

$$a^{-n} = \frac{1}{a^n}$$

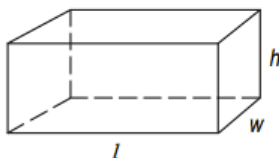
$$\frac{1}{a^{-n}} = a^n$$

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n = \frac{b^n}{a^n}$$

$$a^{\frac{1}{n}} = \left(a^{\frac{1}{n}}\right)^n = \left(a^n\right)^{\frac{1}{n}}$$



$$A = lw$$



$$V = lwh$$

## Linear Equations

**Slope:**  $m = \frac{y_2 - y_1}{x_2 - x_1}$

**Point-Slope Formula:**  $(y - y_1) = m(x - x_1)$

**Slope-Intercept Formula:**  $y = mx + b$

**Standard Equation of a Line:**  $Ax + By = C$

## Arithmetic Properties

**Additive Inverse:**  $a + (-a) = 0$

**Multiplicative Inverse:**  $a \cdot \frac{1}{a} = 1$

**Commutative Property:**  $a + b = b + a$   
 $a \cdot b = b \cdot a$

**Associative Property:**  $(a + b) + c = a + (b + c)$   
 $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

**Identity Property:**  $a + 0 = a$   
 $a \cdot 1 = a$

**Distributive Property:**  $a \cdot (b + c) = a \cdot b + a \cdot c$

**Multiplicative Property of Zero:**  $a \cdot 0 = 0$

**Additive Property of Equality:**  
If  $a = b$ , then  $a + c = b + c$

**Multiplicative Property of Equality:**  
If  $a = b$ , then  $a \cdot c = b \cdot c$

### Quadratic Formula

Solve  $ax^2 + bx + c = 0$ ,  $a \neq 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If  $b^2 - 4ac > 0$  - Two real unequal solns.

If  $b^2 - 4ac = 0$  - Repeated real solution.

If  $b^2 - 4ac < 0$  - Two complex solutions.

### Square Root Property

If  $x^2 = p$  then  $x = \pm\sqrt{p}$

### Distance Formula

If  $P_1 = (x_1, y_1)$  and  $P_2 = (x_2, y_2)$  are two points the distance between them is

$$d(P_1, P_2) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

### Properties of Inequalities

If  $a < b$  then  $a + c < b + c$  and  $a - c < b - c$

If  $a < b$  and  $c > 0$  then  $ac < bc$  and  $\frac{a}{c} < \frac{b}{c}$

If  $a < b$  and  $c < 0$  then  $ac > bc$  and  $\frac{a}{c} > \frac{b}{c}$

### Properties of Absolute Value

$$|a| = \begin{cases} a & \text{if } a \geq 0 \\ -a & \text{if } a < 0 \end{cases}$$

$$|a| \geq 0 \qquad | -a | = |a|$$

$$|ab| = |a||b| \qquad \left| \frac{a}{b} \right| = \frac{|a|}{|b|}$$

$$|a + b| \leq |a| + |b| \quad \text{Triangle Inequality}$$