

TOPICS FORMULA SHEET

SETS $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

LOGIC **DeMorgan's Laws** $\sim(p \wedge q) \Leftrightarrow \sim p \vee \sim q$ $\sim(p \vee q) \Leftrightarrow \sim p \wedge \sim q$

Other laws with no name: $(p \rightarrow q) \wedge (q \rightarrow p) \Leftrightarrow (p \leftrightarrow q)$ $p \rightarrow q \Leftrightarrow \sim p \vee q$

Variations of conditional statement

Conditional $p \rightarrow q$

Converse of conditional $q \rightarrow p$

Inverse of conditional $\sim p \rightarrow \sim q$

Contrapositive of the conditional $\sim q \rightarrow \sim p$

Valid Arguments

Law of Detachment

$$\frac{p \rightarrow q}{p} \therefore q$$

Law of Contraposition

$$\frac{p \rightarrow q}{\sim q} \therefore \sim p$$

Law of Syllogism

$$\frac{p \rightarrow q}{q \rightarrow r} \therefore p \rightarrow r$$

Disjunctive Syllogism

$$\frac{p \vee q}{\sim p} \therefore q$$

Invalid Arguments

Fallacy of the Converse

$$\frac{p \rightarrow q}{q} \therefore p$$

Fallacy of the Inverse

$$\frac{p \rightarrow q}{\sim p} \therefore \sim q$$

GEOMETRY

Area

Rectangle	$A = lw$
Square	$A = s^2$
Parallelogram	$A = bh$
Triangle	$A = \frac{1}{2}bh$
Trapezoid	$A = \frac{1}{2}h(b_1 + b_2)$
Circle	$A = \pi r^2$

Volume

Rectangular solid	$V = lwh$
Cube	$V = s^3$
Cylinder	$V = \pi r^2 h$
Cone	$V = \frac{1}{3}\pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Prism	$V = Bh$
Pyramid	$V = \frac{1}{3}Bh$

Surface Area

Rectangular Solid	$SA = 2lw + 2wh + 2lh$
Cube	$SA = 6s^2$
Cylinder	$SA = 2\pi rh + 2\pi r^2$
Cone	$SA = \pi r^2 + \pi r\sqrt{r^2 + h^2}$
Sphere	$SA = 4\pi r^2$

Circle Circumference $C = 2\pi r$

PROBABILITY

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $P(A \text{ and } B) = P(A)P(B)$

COUNTING RULES

Permutations $nP_r = \frac{n!}{(n-r)!}$ Combinations $nC_r = \frac{n!}{(n-r)!r!}$

STATISTICS

Mean $\bar{x} = \frac{\sum x}{n}$ Standard Deviation $s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$