

TMTH 105

Midterm Exam Formula Sheet

Chapter 1: Numerical Computation

$$\text{Distance} = \text{Rate} \times \text{Time}$$

$$\text{Amount} = \text{Rate} \times \text{Base (where Rate is in decimal form)}$$

$$\text{Percent change} = \frac{(\text{new value} - \text{original value})}{\text{original value}} \times 100$$

$$\text{Percent efficiency} = \frac{\text{output}}{\text{input}} \times 100$$

$$\text{Percent error} = \frac{(\text{measured value} - \text{known value})}{\text{known value}} \times 100$$

$$\text{Percent concentration of ingredient A} = \frac{\text{amount of A}}{\text{total amount of mixture}} \times 100$$

Chapter 2: Algebra

$$(a \pm b)^2 = a^2 \pm 2ab + b^2 \qquad a^2 - b^2 = (a - b)(a + b)$$

Given nonzero real numbers x and y , and integers m and n :

$$x^1 = x \qquad x^0 = 1 \qquad x^{-n} = \frac{1}{x^n}$$

$$(x^m)^n = x^{m \cdot n} \qquad x^m \cdot x^n = x^{m+n} \qquad \frac{x^m}{x^n} = x^{m-n}$$

$$(xy)^n = x^n y^n \qquad \left(\frac{x}{y}\right)^n = \frac{x^n}{y^n} \qquad \left(\frac{x}{y}\right)^{-n} = \left(\frac{y}{x}\right)^n$$

Chapter 5: Graphs

$$\text{slope } m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}, \qquad y\text{-intercept} = b$$

$$\text{Equation of line in slope-intercept form: } y = mx + b$$

Chapter 6: Geometry

2-Dimensional Shape	Formulas
Circle	Circumference = $2\pi r$ or πd
	Area = πr^2 or $\frac{\pi d^2}{4}$
Square	Perimeter = $4s$
	Area = s^2
Rectangle	Perimeter = $2(l + w)$
	Area = lw
Parallelogram	Perimeter = $2(a + b)$
	Area = bh
Rhombus	Perimeter = $4s$
	Area = sh
Trapezoid	Perimeter = $a + b + c + d$
	Area = $\frac{(a+b)h}{2}$
Triangle	Area = $\frac{bh}{2}$
	or using Hero's Formula, Area = $\sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{a+b+c}{2}$

3-Dimensional Shape	Formulas
Cube	Volume = a^3
	Surface Area = $6a^2$
Rectangular parallelepiped	Volume = lwh
	Surface Area = $2(lw + hw + lh)$
Any cylinder or prism	Volume = (area of base)(altitude)
Right cylinder or prism	Lateral surface area = (perimeter of base)(altitude) (not including bases)
Sphere	Volume = $\frac{4}{3}\pi r^3$
	Surface area = $4\pi r^2$
Any cone or pyramid	Volume = $\frac{h}{3}$ (area of base)
Right circular cone or regular pyramid	Lateral surface area = $\frac{s}{2}$ (perimeter of base)
Frustum (any cone or pyramid)	Volume = $\frac{h}{3}(A_1 + A_2 + \sqrt{A_1 A_2})$
Frustum (right circular cone or regular pyramid)	Lateral surface area = $\frac{s}{2}$ (sum of base perimeters) = $\frac{s}{2}(P_1 + P_2)$

Chapter 7: Right Triangles

$$1 \text{ rev} = 360^\circ = 2\pi \text{ rad}, \quad 1^\circ = 60', \quad 1' = 60'', \quad 1 \text{ rad} \approx 57.3^\circ$$

Given $(x, y) \neq (0, 0)$ on terminal arm of angle θ , let $r = \sqrt{x^2 + y^2}$. Then,

$$\sin(\theta) = \frac{y}{r} \quad \cos(\theta) = \frac{x}{r} \quad \tan(\theta) = \frac{y}{x}$$

$$\csc(\theta) = \frac{1}{\sin(\theta)} \quad \sec(\theta) = \frac{1}{\cos(\theta)} \quad \cot(\theta) = \frac{1}{\tan(\theta)}$$

$$c^2 = a^2 + b^2 \text{ (Pythagorean Theorem)}$$

$$\sin(\theta) = \frac{\text{opp}}{\text{hyp}} \quad \cos(\theta) = \frac{\text{adj}}{\text{hyp}} \quad \tan(\theta) = \frac{\text{opp}}{\text{adj}}$$