TMAT 102
MID-TERM EXAM FORMULA SHEET

CHAPTER 1: *Numerical Computation*

Distance = Rate × Time Amount = Rate × Base (where rate is in decimal form)

$$\%\ change = \frac{new\ value - original\ value}{original\ value} \times 100 \qquad \%\ error = \frac{Measured\ Value - Known\ value}{Known\ value} \times 100$$

$$\%\ efficiency = \frac{output}{input} \times 100 \qquad \%\ conc.\ of\ A = \frac{Amount\ of\ A}{Total\ Amount\ of\ Mixture} \times 100$$

CHAPTER 2: Algebra

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

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

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

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

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

CHAPTER 7: *Right Triangles and Vectors*

1 rev = 360° = 2π radians $1^0 = 60'$ $1' = 60''$ $1\ rad \approx 57.3^0$

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

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

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

$c^2 = a^2 + b^2$ (Pythagorean Theorem)

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

CHAPTER 15: ***Oblique Triangles and Vectors***

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

$\sin\theta = \sin(180° - \theta)$ $\cos\theta = \cos(360° - \theta)$ $\tan\theta = \tan(180° + \theta)$

Law of Sines: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Law of Cosines:

$a^2 = b^2 + c^2 - 2bc\cos A$ or $\cos A = \frac{b^2+c^2-a^2}{2bc}$

$b^2 = a^2 + c^2 - 2ac\cos B$ or $\cos B = \frac{a^2 + c^2 - b^2}{2ac}$

$c^2 = a^2 + b^2 - 2bc\cos C$ or $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$

CHAPTER 16: ***Radian Measure, Arc Length and Rotation***

1 rev = 360˚ = 2π radians

Arc Length: $\theta = \frac{s}{r}$ (where θ is in radians)

Area of a Sector: $A = \frac{r^2\theta}{2}$ (where $\boldsymbol{\theta}$ is in radians)

Area of a Segment:

$A = r^2\arccos\left(\frac{r-h}{r}\right) - (r-h)\sqrt{2rh - h^2}$ (*where* arccos $\left(\frac{r-h}{r}\right)$ is in radians)