**Formula Sheet (Midterm) – This may not be your “actual” midterm exam formula sheet, please follow your MAT150.5/MAT150 instructor.**

Range = Max – Min

Class width = $\frac{Range}{Number of classes}$

Midpoint of each class: $x=\frac{\left(Lower limit\right)+(Upper limit)}{2}$

Relative frequency =$ \frac{Class frequency}{Sample size}$

Weighted mean: $\overbar{x}=\frac{\sum\_{}^{}(x∙w)}{\sum\_{}^{}w}$

**Population**

Mean: $μ=\frac{\sum\_{}^{}x}{N}$

Variance: $σ^{2}=\frac{\sum\_{}^{}(x-μ)^{2}}{N}$

Standard deviation: $σ=\sqrt{σ^{2}}$

**Sample**

Mean: $\overbar{x}=\frac{\sum\_{}^{}x}{n}$

Variance: $s^{2}=\frac{\sum\_{}^{}(x-\overbar{x})^{2}}{n-1}$

Standard deviation: $s=\sqrt{s^{2}}$

**Frequency table or distribution**

Mean: $ \overbar{x}=\frac{\sum\_{}^{}\left(x∙f\right)}{n}$, where$ n=\sum\_{}^{}f$

Variance: $ s^{2}=\frac{n∙ \sum\_{}^{}\left(f∙x^{2}\right) -^{ }[ \sum\_{}^{} ( f∙x)]^{2}}{n(n-1)}$

Standard deviation: $s=\sqrt{s^{2}}$

**Correlation coefficient**

 $r=\frac{n\sum\_{}^{}xy-(\sum\_{}^{}x)(\sum\_{}^{}y)}{\sqrt{n\sum\_{}^{}x^{2}-(\sum\_{}^{}x)^{2}}\sqrt{n\sum\_{}^{}y^{2}-(\sum\_{}^{}y)^{2}}}, where n is the number of pairs of data$

**The equation of a regression line**

$$\hat{y}=mx+b$$

$$m=\frac{n\sum\_{}^{}xy-(\sum\_{}^{}x)(\sum\_{}^{}y)}{n\sum\_{}^{}x^{2}-(\sum\_{}^{}x)^{2}} and b=\frac{\sum\_{}^{}y}{n}-m\frac{\sum\_{}^{}x}{n}$$

**Counting**

Permutation: $\_{n}P\_{r}=\frac{n!}{\left(n-r\right)!}, where r\leq n$

Distinguishable permutations: $\frac{n!}{n\_{1}!n\_{2}!n\_{3}!\cdots n\_{k}!}, where n\_{1}+n\_{2}+n\_{3}+\cdots +n\_{k}=n$

Combination: $\_{n}C\_{r}=\frac{n!}{\left(n-r\right)!r!}, where r\leq n$

**Probability**

The complement of event E: $P\left(E^{'}\right)=1-P(E)$

Two events *A* and *B* are independent when $P\left(A\right)=P(B)$

Multiplication Rule: $P\left(A and B\right)=P(A)∙P(B|A)$ Dependent events

 $P\left(A and B\right)=P(A)∙P(B)$ Independent event

Addition Rule: $P\left(A or B\right)=P\left(A\right)+P\left(B\right)-P(A and B)$ Not mutually exclusive

 $P\left(A or B\right)=P\left(A\right)+P(B)$ Mutually exclusive