REFERENCE SHEET

Measurement

Limits of accuracy

half the smallest unit

$$\text{Absolute error} = \frac{1}{2} \times \text{precision}$$

Upper bound = measurement + absolute error

Lower bound = measurement – absolute error

Length

circumference of a circle

$$l = \frac{\theta}{360} \times 2\pi r$$

arc length

Area

area of a circle

$$A = \frac{\theta}{360} \times \pi r^2$$

area of a sector

$$A = \frac{h}{2}(a + b)$$

area of a trapezium

$$A \approx \frac{h}{2}(d_f + d_l)$$

trapezoidal rule

Surface area

rectangle wrapped around

two circular ends

$$A = 2\pi r^2 + 2\pi rh$$

surface area of a cylinder

surface area of a sphere

$$A = 4\pi r^2$$

Volume

volume of a prism

$$V = \frac{1}{3}Ah$$

volume of a pyramid or cone

$$V = \frac{4}{3}\pi r^3$$

volume of a sphere

Trigonometry

$$\sin A = \frac{\text{opp}}{\text{hyp}}, \quad \cos A = \frac{\text{adj}}{\text{hyp}}, \quad \tan A = \frac{\text{opp}}{\text{adj}}$$

$$A = \frac{1}{2}ab\sin C$$

area of a triangle

FLIP to find angle

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

the sine rule
- two angles
- two opposite sides

√

$$c^2 = a^2 + b^2 - 2ab\cos C$$

finding side

the cosine rule
- three sides
- one angle

REMEMBER SHIFT

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

finding angle

REFERENCE SHEET

Financial Mathematics

Future value

$$FV = PV(1+r)^n$$

number of time periods

rate as a decimal

present value

$$PV = \frac{FV}{(1+r)^n}$$

Straight-line method of depreciation

salvage value

$$S = V_0 - Dn$$

original value

fixed amount of depreciation

Declining-balance method of depreciation

salvage value

$$S = V_0(1-r)^n$$

original value

Statistical Analysis

An outlier is a score

less than $Q_1 - 1.5 \times IQR$

or

more than $Q_3 + 1.5 \times IQR$

Q_1 lower quartile

IQR = Q_3 - Q_1

Q_3 lower quartile

z-score

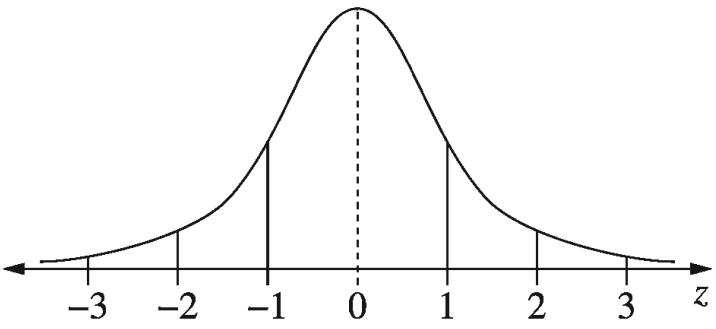
$$z = \frac{x - \mu}{\sigma}$$

x = score

μ = mean

σ = standard deviation

Normal distribution



- approximately 68% of scores have z-scores between −1 and 1 — 16% / 34% / 34% / 16%
- approximately 95% of scores have z-scores between −2 and 2 — 2.5% / 47.5% / 47.5% / 2.5%
- approximately 99.7% of scores have z-scores between −3 and 3 — 0.15% / 49.85% / 49.85% / 0.15%