MCF3M1 Formula Sheet

This is a list of formulas you should know for the exam. You are NOT allowed to use this sheet during the exam.

Quadratic Functions

Standard form $f(x) = ax^2 + bx + c$

Y-intercept: c

Vertex form $f(x) = a(x-h)^2 + k$

Vertex: (h,k)

Factored form $f(x) = a(x-s)(x-t)$

Zeros: s and t

Mapping notation

$(x,\ y) \rightarrow (x+h,\ ay+k)$

$(-1,\ 1)$

$(0,\ 0)$

$(1,\ 1)$

Quadratic formula

Given $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant $b^2 - 4ac$

Finance

Simple interest $I = \Pr t$

I	interest	r	interest rate
P	principal	t	time (in years)

Compound interest $A = P(1+i)^n$

A	amount	P	principal
i	interest rate per compounding period		
n	number of compounding periods		

Annuities

Amount $A = \dfrac{R\left[(1+i)^n - 1\right]}{i}$

A	amount	i, n	as above
R	regular deposit		

Present value $P = \dfrac{R\left[1-(1+i)^{-n}\right]}{i}$

P	present value	i, n	as above
R	regular withdrawal or payment		

Exponents and Exponential Functions

Exponent laws

$x^m \cdot x^n = x^{m+n}$ $\qquad$ $\dfrac{x^m}{x^n} = x^{m-n}$

$(x^m)^n = x^{mn}$ $\qquad$ $x^0 = 1$

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

$x^{-n} = \dfrac{1}{x^n}$ $\qquad$ $\left(\dfrac{x}{y}\right)^{-n} = \left(\dfrac{y}{x}\right)^n$

$x^{\frac{m}{n}} = \sqrt[n]{x^m} = \left(\sqrt[n]{x}\right)^m$

Logarithms $\log x^n = n \log x$

Exponential growth and decay

$P(x) = P_o b^x$ $\qquad$ P_o initial amount; b growth/decay factor

Doubling period (k) $P(x) = P_o 2^{\frac{x}{k}}$

Half-life (h) $P(x) = P_o\left(\dfrac{1}{2}\right)^{\frac{x}{h}}$

Trigonometry

Right triangles ($90°$ angle)

$\sin\theta = \dfrac{opp}{hyp}$ $\qquad$ $\cos\theta = \dfrac{adj}{hyp}$ $\qquad$ $\tan\theta = \dfrac{opp}{adj}$

Non-right triangles

Sine law $\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$

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

Cosine law $a^2 = b^2 + c^2 - 2bc\cos A$

Trigonometric functions

$f(x) = a\sin(x-c) + d$

$f(x) = a\cos(x-c) + d$

Domain $D: \{x \in R \mid \text{state restrictions}\}$

Range $R: \{f(x) \in R \mid \text{state restrictions}\}$