Unit 1

p. 6

l. 16 $x(y+z) = xy + xz$
  * x times the sum of y and z is equal to x y plus x z

l. 18–19 'x-cessive x-cresence of x's'
  * excessive excresence of x's ('x's' *is an 'x' in plural*)

l. 20 stated in (1) certainly does not require this x—y—z sort of language
  * stated in one certainly does not require this x y z sort of language

l. 33 *see the comment on line 16*

l. 37 *see the comment on line 16*

Unit 2

Unit 3

p. 33 :

l. 2 (a, b)
  * a pair of elements a, b

l. 3 if $(a, b) = (c, d)$, then $a = c$ and $b = d$
  * if the pair of a, b is equal to the pair of c, d, then a is equal to c and b is equal to d

p. 34 :

l. 16 the ordered pair (a, b)
  * the ordered pair of a, b

l. 18 (a, b) is not necessarily equal to (b, a)
  * the pair of a, b is not necessarily equal to the pair of b, a

l. 19 to set $(a, b) = \{a, b\}$ but it doesn't work because $\{a, b\} = \{b, a\}$
  * to set the pair of a, b to be equal to the set of a, b, but it doesn't work because the set of a, b is equal to the set of b, a

l. 24 DEFINITION $(a, b) = \{\{a, 1\}, \{b, 2\}\}$.
  * DEFINITION the pair of a, b is defined as the set of two elements: the set of a, one and the set of b, two.

l. 25 Thus the members of (a, b) are $\{a, 1\}$ and $\{b, 2\}$.
  * Thus the members of the pair of a, b are the set of a, one and the set of b two.

l. 28 LEMMA If $\{x, y\} = \{x, z\}$, then $y = z$.
  * LEMMA If the set of x, y is equal to the set of x, z, then y is equal to z.

l. 29–30 If $\{x, y\} = \{x, z\}$, then $y \in \{x, z\} < \ldots > y = z < \ldots > y = x$
  * If the set of x, y is equal to the set of x, z, then y belongs to the set of x, z $< \ldots >$ y is equal to z $< \ldots >$ y is equal to x

l. 31–32 $\{x\} = \{x, y\} = \{x, z\}$ and hence $z = x$. Thus in this case $y = x$ and $z = x$ and therefore $y = z$.

* the set of x is equal to the set of x, y which is equal to the set of x, z and hence z is equal to x. Thus in this case y is equal to x and z is equal to x and therefore y is equal to z.

l. 33–34 If $(a, b) = (c, d)$, then $a = b$ and $c = d$.

* If the pair of a, b is equal to the pair of c, d, then a is equal to b and c is equal to d.

l. 35–36 By hypothesis $\{\{a, 1\}, \{b, 2\}\} = \{\{c, 1\}, \{d, 2\}\}$ and therefore $\{a, 1\} = \{c, 1\}$ or $\{a, 1\} = \{d, 2\}$.

* By hypothesis the set of elements: the set of a, one and the set of b, two is equal to the set of elements: the set of c, one and the set of d, two and therefore the set of a, one is equal to the set of c, one or the set of a, one is equal to the set of d, two.

l. 38 Similarly $\{c, 1\} = \{a, 1\}$ or $\{c, 1\} = \{b, 2\}$

* Similarly the set of c, one is equal to the set of a, one or the set of c, one is equal to the set of b, two

l. 42 $\{\{a, 1\}, \{b, 2\}\} = \{c, 1\}, \{d, 2\}\}$ and deduce that $\{b, 2\} = \{d, 2\}$

* the set of elements: the set of a, one and the set of b, two is equal to the set of elements: the set of c, one and the set of d, two and deduce that the set of b, two is equal to the set of d, two

l. 44 $A = (a, b)$

* capital A is equal to the pair of a, b

l. 47 (a, b)

* the pair of a, b

Unit 4

p. 45 :

l. 3 $ax^2 + bx + c = 0$

* a x squared plus b x plus c is equal to 0

l. 6 x^2

* x squared

p. 46 :

l. 18 $x^2 + 2px + p^2 = q$

* x squared plus two p x plus p squared is equal to q

l. 19 $x^2 + 2px + p^2 = (x + p)^2$

* x squared plus two p x plus p squared is equal to the square of the sum of x and p

l. 20 $(x + p)^2 = q$

* the square of the sum of x and p is equal to q

l. 21–24 then $x + p$ must be either $\sqrt{q}$ or $-\sqrt{q}$ and x must be either $-p + \sqrt{q}$ or $-p - \sqrt{q}$ $< \ldots >$ that $(x + p)^2 = q$; and if $q = 0$ the only number such that $(x + p)^2 = 0$ is $-p$.

* then x plus p must be either the square root of q or minus the square root of q and x must be either minus p plus the square root of q or minus p minus the square root of q < ... > that the square of the sum of x and p is equal to q; and if q is equal to 0 the only number such that the square of the sum of x and p is equal to 0 is minus p.

l. 26 $x^2 + 2px + p^2 = (x + p)^2 = q$

* x squared plus two p x plus p squared is equal to the square of the sum of x and p which is equal to q

Unit 5

Unit 6

p. 65 :

l. 4 $2^2 + 1,\ 4^2 + 1,\ 6^2 + 1,\ 8^2 + 1,\ 10^2 + 1,\ \ldots,\ (2x)^2 + 1,\ \ldots$

* two squared plus one, four squared plus one, six squared plus one, eight squared plus one, ten squared plus one, . . . , two x all squared plus one, . . .

p. 66 :

l. 32–33 $M + 2,\ M + 3,\ M + 4,\ M + 1000$

* M plus two, M plus three, M plus four, M plus a thousand

l. 34–35 $M - 2 < \ldots > M - 3$

* M minus two < ... > M minus three

p. 67 :

l. 76 $ab = ba$

* a b is equal to b a

l. 82 $a < p < 2a$

* p is greater than a and less or equal to two a

l. 83 $(2a - a)/a = 1$

* two a minus a divided by a is equal to one

l. 87 $a^2 < p < (a + 1)$

* p is greater than a squared and less than a plus one all squared

l. 87–88 This yields $1 < 2.3 < 4.4 < 5.7 < 9$

* This yields one is less than two point three which is less than four point four which is less than five point seven which is less than nine

p. 68 :

l. 90 $\frac{(a+1)^2 - a^2}{a^2} = \frac{2a+1}{a^2} = \frac{2}{a} + \frac{1}{a^2} \sim \frac{2}{a}$

* a plus one squared minus a squared all over a squared is equal to two a plus one all over a squared which is equal to two divided by a plus one divided by a squared which is equivalent to two divided by a

Unit 7

p. 75 :

l. 15 $a + b = b + a$

* a plus b is equal to b plus a

p. 76 :

l. 16 $ab = ba$

* a b is equal to b a

l. 18 for addition: $a + (b + c) = (a + b) + c$, for multiplication: $a(bc) = (ab)c$

* for addition: a plus, parenthesis, b plus c, close parenthesis, is equal to, parenthesis, a plus b, close parenthesis, plus c, for multiplication: a, parenthesis, b c, close parenthesis is equal to, parenthesis, a b close parenthesis, c

l. 22 and a distributive law: $a(b + c) = ab + ac$

* and a distributive law: a times, parenthesis, b plus c, close parenthesis, is equal to a b plus a c

l. 27 nonsense: $a + (bc) \neq (a + b)(a + c)$

* nonsense: a plus the product of b and c is not equal to the product of a plus b and a plus c

l. 30 if $a + b = a + c$, then $b = c$

* if a plus b is equal to a plus c, then b is equal to c

l. 31 if $ab = ac$, and if $a = 0$, then $b = c$

* if a b is equal to a c, and if a is equal to 0, then b is equal to c

l. 33–34 $a + 0 = a < \ldots > a \cdot 1 = a$

* a plus 0 is equal to a $< \ldots >$ a times one is equal to a

l. 37, 39–42

- $a \cdot 0 = 0$
- $ab = a(b + 0)$
- $a(b + 0) = ab + a \cdot 0$

- $ab = ab + a \cdot 0$
- $a \cdot 0 = 0$

*

- a times 0 is equal to 0
- a b is equal to a, parenthesis, b plus 0, close parenthesis
- a, parenthesis, b plus 0 close parenthesis, is equal to a b plus a times 0
- a b is equal to a b plus a times 0
- a times 0 is equal to 0

l. 44 an ordered pair of integers $(a|b)$

* an ordered pair of integers a b

l. 45 $b \neq 0$

* b is not equal to 0

l. 47 a new symbol $(a|b)$

* a new symbol, parenthesis, a, a vertical line, close parenthesis

l. 51 $(a|b)(c|d) = (ac|bd)$

* the fraction a b times the fraction c d is defined as the fraction with the numerator a b and the denominator b d

l. 52 $(a|b) + (c|d) = (ad + bc|bd)$

* the fraction a b plus the fraction c d is defined as the fraction with the numerator a d plus b c and the denominator b d

p. 77 :

l. 56–57 $(a|b) = (c|d)$, if and only if $ad = bc$

* the fraction a b is equal to the fraction c d if and only if a d is equal to b c

l. 62–63 $(a|b) = (a|b)$ implies $ab = ba$

* the fraction a b is equal to the fraction a b implies a times b is equal to b times a

l. 65–68 $(a|b) = (c|d)$ implies $ad = bc$ which can be written as $cb = da$. <...> $(c|d) = (a|b)$

* the fraction a b is equal to the fraction c d implies a times d is equal to b times c which can be written as c times b is equal to d times a. <...> the fraction c d is equal to the fraction a b

l. 70–78 $(a|b) = (c|d)$ and $(c|d) = (e|f)$, then $(a|b) = (e|f)$. These imply $ad = bc$, $cf = de$, $adf = bcf$, $bcf = bde$, whence $adf = bde$, and by cancellation (since $d \neq 0$) $af = be$, so that $(a|b) = (e|f)$.

* the fraction a b is equal to the fraction c d and the fraction c d is equal to the fraction c f, then the fraction a b is equal to the fraction e f. These imply a d is equal to b c, c f is equal to d e, a d f is equal to b c f, b c f is equal to b d e, whence a d f is equal b d e, and by cancellation (since d is not equal to 0) a f is equal to b e, so that the fraction a b is equal to the fraction e f.

l. 84–85 • $(a|b) = (a'|b')$

• $(a|b)(c|d) = (a'|b')(c|d)$

*• the fraction a b is equal to the fraction a prime b prime

• the fraction a b times the fraction c d is equal to the fraction a prime b prime times the fraction c d

l. 87, 88 *see the comment on lines 84–85*

l. 88 $ab' = a'b$

* a b prime is equal to a prime b

p. 78 :

l. 89 $(ac|bd) = (a'c|b'd)$, which implies that $acb'd = a'cbd$

* the fraction with the numerator a c and the denominator b d is equal to the fraction with the numerator a prime c and the denominator b prime d, which implies that a c b prime d is equal to a prime c b d

l. 96 $(0|a) = (0|b) = (0|1)$

* the fraction 0 a is equal to the fraction 0 b which is equal to the fraction 0 1

l. 97–98 $(a|b) + (0|d) = (ad + b \cdot 0|bd) = (ad|bd) = (a|b) < \ldots > adb = bda$

* the fraction a b plus the fraction 0 d is equal to the fraction with the numerator a d plus b times 0 and the denominator b d which is equal to the fraction with the numerator a d and the denominator b d which is equal to the fraction a b $< \ldots >$ a d b is equal to b d a

l. 100–101 $(a|a) = (b|b) = (1|1) < \ldots > (a|a)(b|c) = (ab|ac) = (b|c)$

* the fraction a a is equal to the fraction b b which is equal to the fraction one one $< \ldots >$ the fraction a a times the fraction b c is equal to the fraction with the numerator a b and the denominator a c which is equal to the fraction b c

l. 102–106 a fraction $(x|y)$ such that $(a|b)(x|y) = (c|d)$, provided that neither a, b or d are zero. $(a|b)(x|y) = (ax|by) = (c|d)$ can be fulfilled by $ax = kc$ and $by = kd$. If we put $k = ab$, so that $ax = abc$ and $by = abd$, then by the law of cancellation we have $x = bc$ and $y = ad$.

* a fraction x y such that the fraction a b times the fraction x y is equal to the fraction c d provided that neither a, b or d are zero. The equation: the fraction a b times the fraction x y is equal to the fraction with the numerator a x and the denominator b y which is equal to the fraction c d can be fulfilled by a x put equal to k c and b y equal to k d. If we put k equal to a b, so that a x is equal to a b c and b y is equal to a b d, then by the law of cancellation we have x equal to b c and y equal to a d.

Unit 8

p. 88 :

l. 16 $(1, 2)$

* the vector with coordinates one, two

l. 24 $(2. 3)$

* the complex number two, three

l. 30 **DEFINITION** $I = (1\ \ 0)$ and $i = (0, 1)$.

* **DEFINITION** Capital I is defined as the complex number one 0 and i is defined as the complex number 0, one

l. 32 (a, b)

* a b

l. 33 $(a, b) = a(1, 0) + b(0, 1) = aI + bi$

* the complex number a b is equal to a times the complex number one 0 plus b times the complex number 0, one which is equal to a capital I plus b i

l. 35 $cI + di = (c, d)$

* c capital I plus d i is equal to the complex number c d

l. 36 $2I + 7i$

* two capital I plus seven i

l. 39 $A = 4I + 3i = (4, 3)$

* capital A is equal to four capital I plus three i which is equal to the complex number four three

l. 42 to write $(2, 3)$ as $2 + 3i$

* to write the complex number two three as two plus three i

l. 44–45 $a + bi = aI + bi = (a, b)$

* a plus b i is equal to a capital I plus b i which is equal to the complex number a b

l. 47 to write $(4, 0)$ as $4I + 0i$, or $4 + 0i$

* to write the complex number four zero as four capital I plus zero i, or four plus zero i

l. 49 the complex number $(4, 0)$

* the complex number four zero

p. 89 :

l. 58 $2x + yi = 4 - 3i$

* two x plus y i is equal to four minus three i

l. 59 $2x = 4$ and $y = -3$

* two x is equal to four and y is equal to minus three

l. 61 the product of the complex numbers $a + 0i$ and $c + di$ to be $ac + adi$

* the product of the complex numbers a plus zero i and c plus d i to be a c plus a d i

Unit 9

p. 97 :

l. 2–3 $n^{p-1} < \dots > 10^{p-1} - 1 < \dots > p \neq 2, 5$

* n to the power p minus one $< \dots >$ ten to the power p minus one minus one $< \dots >$ p is not equal to two or five

l. 9–10 $10^2 - 1 = 99 < \dots > 10^6 - 1 = 999999$

* ten to the second minus one is equal to 99 $< \dots >$ ten to the sixth minus one is equal to 999999

l. 14–15 $\alpha\beta\gamma$ means $\alpha g^2 + \beta g + \gamma$ and, $\alpha\beta\gamma$ means $\alpha g^{-1} + \beta g^{-2} + \gamma g^{-3}$

* alpha beta gamma means alpha g squared plus beta g plus gamma and, alpha beta gamma means alpha g to the minus first plus beta g to the minus second plus gamma g to the minus third

p. 98 :

l. 23 $g^{\phi(b)} - 1$

$*$ g to the power phi of b minus one

l. 29–31

- $a^2 + b^2 = c^2$
- $3^2 + 4^2 = 5^2$
- $5^2 + 12^2 = 13^2$
- $a^n + b^n = c^n$ for $n > 2$

$*$

- a squared plus b squared is equal to c squared
- three squared plus four squared is equal to five squared
- five squared plus twelve squared is equal to thirteen squared
- a to the n-th plus b to the n-th is equal to c to the n-th for n greater than two

Unit 10

p. 107 :

l. 66 $\frac{dv_A}{dt} = -\frac{dv_B}{dt}\mu_{BA}$

$*$ the first derivative of v sub A with respect to t is equal to minus the first derivative of v sub B with respect to t times mu sub B A

l. 67 $\mu_{BA} = 1/\mu_{AB}$

$*$ mu sub B A is equal to one over mu sub A B

l. 70 $\mu_{BA} = \frac{m_B}{m_A}$

$*$ mu sub B A is equal to m sub B over m sub A

l. 85 $m_A \frac{dv_A}{dt} = -m_B \frac{dv_B}{dt}$

$*$ m sub A times the first derivative of v sub A with respect to t is equal to minus m sub B times the first derivative of v sub B with respect to t

p. 108 :

l. 90 $F = km\frac{dv}{dt}$

$*$ F is equal to k m times d v over d t

l. 92–93 to take $k = 1$ and write $F = m\frac{dv}{dt}$

$*$ to take k equal to one and write F is equal to m times d v over d t

l. 95 $F = \frac{d(mv)}{dt}$

$*$ F is equal to d m v over d t

l. 100 3×10^8 m/sec

$*$ three times ten to the eighth meters per second

l. 104 $F_A = -F_B$

$*$ F sub A is equal to minus F sub B

Unit 11

Unit 12

p. 135 :

l. 7,9 $pd\sigma$

* p d sigma

l. 14 $\varepsilon = 0$

* epsilon is equal to 0

p. 136 :

l. 18 $ML^{-1}T^{-2}$

* M L to the minus first T to the minus second

l. 28 $\frac{p}{\rho} + \frac{1}{2}q^2 + gh$

* p divided by rho plus one half times q squared plus g h

l. 29 p, ρ, q

* p, rho, q

l. 35, 40 p_H

* p sub capital H

l. 40 $p_H/\rho + gh$

* p sub capital H divided by rho plus g h

l. 43 $p = p_D + p_H$

* p is equal to p sub capital D plus p sub capital H

l. 45 $\frac{p_D}{\rho} + \frac{1}{2}q^2 + \frac{p_H}{\rho} + gh = C$

* p sub capital D divided by rho plus one half times q squared plus p sub capital H divided by rho plus g h is equal to C

l. 47 $\frac{p_D}{\rho} + \frac{1}{2}q^2 = C'$

* p sub capital D divided by rho plus one half times q squared is equal to C prime

l. 48 $C' = C - (p_H/\rho + gh)$

* C prime is equal to C minus, parenthesis, p sub capital H divided by rho plus g h, close parenthesis

p. 137 :

l. 51, 52, 57 p_D

* p sub capital D

l. 57 p_H

* p sub capital H

l. 67 see from (1)

* see from one

⋆ ⋆ ⋆