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2b. DECLASSIFICATION/DOWNGRADING SCHEDULE		unlimited.				
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ITEM #11, TITLE: RESEARCH IN ALGEBRAIC MANIPULATION, 1 JULY 81 - 30 JUNE 82.

ITEM #19, ABSTRACT, CONTINUED: The major effort in the last few months of the period was on the solution of ordinary differential equations (ODEs) by a Japanese visitor, Professor Shunro Watanabe. Professor Watanabe has begun to develop a subsystem of MACSYMA that solves ODEs by converting them to P-functions, originally studied by Riemann. One example of this approach to solving ODEs is given within. One goal of this work is to solve a large percentage of Kamke's equations using this general approach.

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PROGRESS REPORT FOR THE 1981-82 PERICD

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This was a transitional year. One in which we phased down research on b = 2 p = 2 p = 2the integration of algebraic functions (described in last year's report), and one in which we began a new line of research on the solution of ordinary differential equations in closed form, b = q + r.

Barry Trager continued his doctoral thesis research on the integration of algebraic function while working at IMB Research in Yorktown Heights. The report on this work previously submitted still gives a very good account of this line of research. The approach he has taken is to determine the minimal extension field in which the integral can be expressed. This can lead to a tremendous improvement in both the running time and the size and complexity of the expression that is produced.

The major effort in the last few months of the period was on the solution of ordinary differential equations (ODEs) by a Japanese visitor, Prof. Shunro Watanabe. Professor Watanabe has begun to develop a subsystem of MACSYMA that solves ODEs by converting them to P-functions, originally studied by Riemann. One example of this approach to solving ODEs is given below. One goal of this work is to solve a large percentage of Kamke's equations using this general approach.

PALGS FASL DSK SWATAN being loaded Loading done we solve INF 1 1 1 3 2 12 y = (X - 1)₽] (x) 1 PALG4 FASL DSK SWATAN being loaded Loading done POHAS2 FASL DSK SWATAN being loaded Loading done 1/4 1/4 1/4 K1 T (2 SQRT(T + T + 1) + SQRT(3) (T + 1)) (X - 1)3 1 (T - 1) 1/12 1/4 1/4 1/4 2 (SQRT(3) (T + 1) - 2 SQRT(T + T + 1)) (X - 1) K2 T 3 1/12(T - 1) where $t=x^{(1/3)}$ Time= 13449 msec. 1/4 1/4 1/4 K1 T (2 SQRT(T + T + 1) + SQRT(3) (T + 1)) (X - 1) (D8) · 3 1/12 (T - 1)1/4 1/4 1/4 (SQRT(3) (T + 1) - 2 SQRT(T + T + 1))K2 T (X - 1) 3 1/12 (T - 1)Time= 15278 msec. (D9) BATCH DONE (C10) closefile(buffer, save); AIR FURCE OF CLORING OF CONT WITTER 1 NOTICE OF TIME FOR A TOP FOR This t 107 0 District dar el MATTHEW J. KELCHA Chief, Technical Information Division

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