MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 – FEBRUARY 2013
ROUND 1 ALGEBRA 2: ALGEBRAIC FUNCTIONS

ANSWERS

A) _____

B) (_____ , _____ , _____)

C) _____

A) Let $f(x) = \sqrt{3x-4}$. Compute: $f^{-1}\left(\sqrt{5}\right) + f\left(\frac{8}{3}\right)$.

B) Given: $\begin{cases} f(x) = 3x-2 \\ g(x) = (x-2)(x+3) + A, \text{ where } A < 0 \end{cases}$

For several integer values of *A*, the composite function $h(x) = g \circ f(x) = g\left(f\left(x\right)\right)$ has two distinct rational zeros, r_1 and r_2, where $r_1 < r_2$.

For the largest possible value of *A*, compute the ordered triple $\left(A, r_1, r_2\right)$

C) $f(x)$ is a 4^{th} degree polynomial with a leading coefficient of 1.
Curiously, $f(1) = f(2) = f(3) = f(4) = 6$.
Determine the sum of the zeros of this function.