MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 – FEBRUARY 2016
ROUND 1 ALGEBRA 2: ALGEBRAIC FUNCTIONS

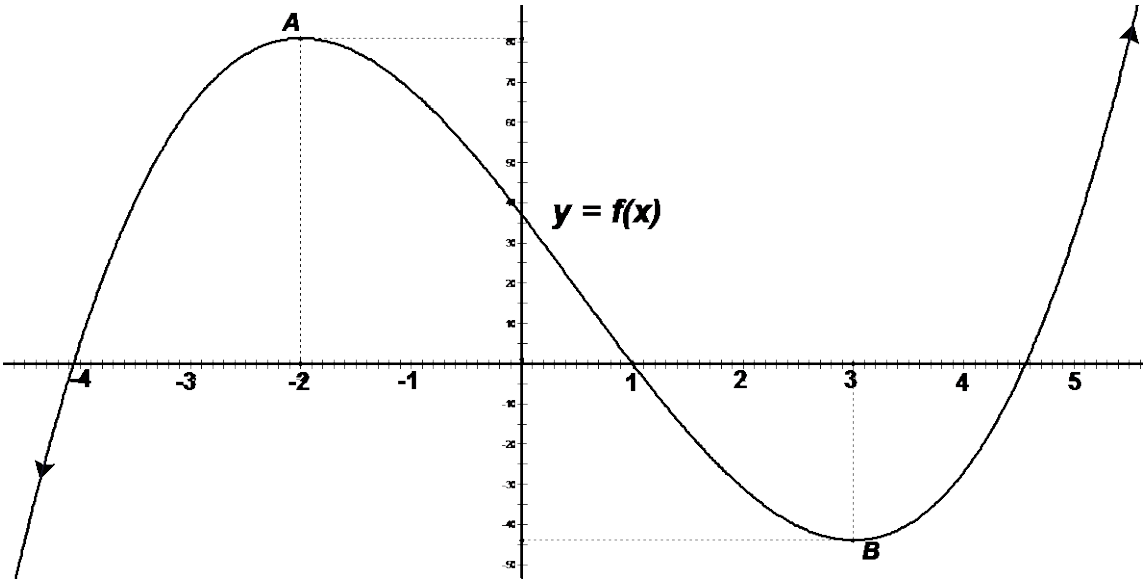
ANSWERS

A) _____

B) 1 2 3 4 5

C) (_____ , _____ , _____)

A) Let $f(x) = 11 - 3x$. Compute $\frac{1}{f(2)} - \frac{1}{f^{-1}(2)}$.



B) Which of these statements about the graph of the cubic polynomial function $y = f(x)$ are true? Circle the correct answer(s) in the answer blank above.

1) The scale used on the *x*-axis is the same as the scale used on the *y*-axis..
2) The maximum value of the function occurs at point *A*.
3) There are <u>exactly</u> three values of *x* for which $f(x) = 0$.
4) If $-2 < a < b < c < 3$, then $f(a) < f(b) < f(c)$.
5) If $f(a) < 0$ and $f(b) > 0$, then for some *c* between *a* and *b*, $f(c) = 0$.

C) The zeros of $f(x) = ax^2 + bx + c$ are r_1 and r_2. If these zeros are each increased by 1, their product triples. Compute the ordered triple (*a*, *b*, *c*), where *a*, *b* and *c* are integers and $a > 0$, for which the original roots are in a 2 : 1 ratio and the sum $a + b + c$ has a <u>maximum</u> value.