PRE–AP ALGEBRA 2

3B.3 CLASSWORK

1) For each quadratic function $y = f(x)$, use the Quadratic Formula to calculate the roots. Also, state the x– and y–intercepts of each function.

a) $f(x) = x^2 - 14x + 38$
b) $f(x) = x^2 - 8x + 65$

(a) $x = \frac{14 \pm \sqrt{(-14)^2 - 4(1)(38)}}{2(1)} = \frac{14 \pm \sqrt{44}}{2} =$

$= \frac{14 \pm \sqrt{4}\sqrt{11}}{2} = \frac{14 \pm 2\sqrt{11}}{2} = 7 \pm \sqrt{11}$

x-ints: $x = 7 + \sqrt{11}$ $x = 7 - \sqrt{11}$

y-int: $y = f(0) = 38$

(b) $x = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(65)}}{2(1)} = \frac{8 \pm \sqrt{-196}}{2} =$

$= \frac{8 \pm 14i}{2} = 4 \pm 7i$

x-ints.: none

y-int: $y = f(0) = 65$

2) Construct a quadratic function $y = f(x)$ which has

a) $x = 13 - \sqrt{3}$
b) $x = 11 + 3i$

as one of its roots. Also, use substitution to verify that the roots obey $f(x) = 0$.

(a) $f(x) = [x - (13 - \sqrt{3})][x - (13 + \sqrt{3})] =$

$= x^2 - (13 + \sqrt{3})x - (13 - \sqrt{3})x + (13 - \sqrt{3})(13 + \sqrt{3})$

$= x^2 - 13x - \sqrt{3}x - 13x + \sqrt{3}x + 169 - 3 =$

$= x^2 - 26x + 166$

$(13 \pm \sqrt{3})^2 = 169 \pm 26\sqrt{3} + 3 = 172 \pm 26\sqrt{3}$

$x^2 - 26x + 166 = (172 \pm 26\sqrt{3}) - 26(13 \pm \sqrt{3}) + 166 =$

$= 172 \pm 26\sqrt{3} - 338 \mp 26\sqrt{13} + 166 =$

$= 172 - 338 + 166 = 0$

(b) $f(x) = [x - (11 + 3i)][x - (11 - 3i)] =$

$= x^2 - (11 - 3i)x - (11 + 3i)x + (11 + 3i)(11 - 3i) =$

$= x^2 - 11x + 3ix - 11x - 3ix + 121 - 9i^2 =$

$= x^2 - 22x + 121 + 9 = x^2 - 22x + 130$

$x^2 = (11 \pm 3i)^2 = 121 \pm 66i + 9i^2 = 121 - 9 \pm 66i$

$= 112 \pm 66i$

$x^2 - 22x + 130 = (112 \pm 66i) - 22(11 \pm 3i) + 130 =$

$= 112 \pm 66i - 242 \mp 66i + 130 =$

$= 112 - 242 + 130 = 0$