MTH 130 Precalculus, Classwork 7 Fall 2014

(1) Let $z = 2 + 3i$ and let $w = 1 - 2i$. Find:

(a) $2z$ $\quad 2(2+3i) = 4+6i$

(b) $z + w$ $\quad (2+3i)+(1-2i) = 3+i$

(c) $z - w$ $\quad (2+3i)-(1-2i) = 1+5i$

(d) iz $\quad i(2+3i) = 2i-3 = -3+2i$

(e) zw $\quad (2+3i)(1-2i) = 2-4i+3i-6i^2 = 8-i$

(f) z^2 $\quad (2+3i)(2+3i) = 4+12i+9i^2 = -5+12i$

(g) z/w $\quad \frac{2+3i}{1-2i}\,\frac{1+2i}{1+2i} = \frac{2+4i+3i+6i^2}{1+4} = \frac{-4+7i}{5} = \frac{-4}{5}+\frac{7}{5}i$

(2) Find all zeros of the polynomials $P(x) = x^6 - 3x^4 - 10x^2$.

$x^2(x^4-3x^2-10) = x^2(x^2-5)(x^2+2)$

$= x^2(x-\sqrt{5})(x+\sqrt{5})(x-\sqrt{2}i)(x+\sqrt{2}i)$

zeros: $0, \sqrt{5}, -\sqrt{5}, \sqrt{2}i, -\sqrt{2}i$

(3) Factor the polynomial $P(x) = x^4 + 3x^2 - 4$ completely.

$(x^2+4)(x^2-1) = (x+2i)(x-2i)(x-1)(x+1)$

(4) Find a polynomial of degree 4 with integer coefficients with zeros $1 - i$, $2 + i$.

$(x-(1-i))(x-(1+i))(x-(2+i))(x-(2-i))$

$(x^2-2x+2)(x^2-4x+5)$