

Classwork 5
Precalculus MTH 130
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Name: SOLUTIONS

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

$$\begin{array}{l|l} x^2 + 2 = 0 & = x^2(x^4 - 3x^2 - 10) \\ x^2 = -2 & = x^2(x^2 - 5)(x^2 + 2) \\ x = \pm\sqrt{-2} = \pm\sqrt{2}i & = x \cdot x (x - \sqrt{5})(x + \sqrt{5})(x + \sqrt{2}i)(x - \sqrt{2}i) \end{array}$$

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

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

$$\begin{array}{l|l} x^2 + 4 = 0 & = (x^2 + 4)(x^2 - 1) \\ x^2 = -4 & = (x + 2i)(x - 2i)(x + 1)(x - 1) \\ x = \pm\sqrt{-4} & \\ = \pm 2i & \end{array}$$

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

other zeros: $1 + i, 2 - i$

$$\begin{aligned} Q(x) &= (x - (1 - i))(x - (1 + i))(x - (2 + i))(x - (2 - i)) \\ &= (x^2 - 2x + 2)(x^2 - 4x + 5) \\ &= x^4 - 6x^3 + \cancel{15}x^2 - 18x + 10 \\ &\quad \quad \quad 15 \end{aligned}$$