

Quiz 3 Proposal Version 4

1. Consider the equation

$$6x^5 - 3x^4 + x - 10 = 0.$$

- (a) What does the rational root theorem predict for possible rational roots of the equation?
- (b) What are the possibilities for the number of positive (real) roots of the equation?
- (c) What are the possibilities for the number of negative (real) roots of the equation?
- (d) Do your results in parts (b) and (c) reduce the possible rational roots in part (a)? If so, what are the possible rational roots now?
- (e) Do your results in parts (b) and (c) predict that the equation has complex roots? If so, what are the possibilities for the number of complex roots?
- (f) What is the largest absolute value for any real root of the equation?
- (g) What is the largest modulus for any complex root of the equation?
- (h) Does the result in part (f), further reduce the possible rational roots in part (d). If so, what are the possible rational roots now?
- (i) If you knew that $z = a + bi$ is a root of the equation, could you predict another root? Explain.

2 Solve the following equation for matrix \mathbf{X} ,

$$6\mathbf{X} + \begin{pmatrix} a & 2 \\ b & 3 \\ 4 & c \end{pmatrix} = \begin{pmatrix} d & -1 \\ -3 & f \\ 0 & g \end{pmatrix}$$

where $a, b, c, d, f,$ and g are given constants.