INSTRUCTIONS: Books, notes, and electronic devices are not permitted. Write (1) your full name, (2) 1340/Exam 1, (3) lecture number/instructor name and (4) FALL 2019 on the front of your bluebook. Make a grading table for 4 problems and a total. Do all problems. Start each problem on a new page. Box your answers. A correct answer with incorrect or no supporting work may receive no credit, while an incorrect answer with relevant work may receive partial credit. Justify your answers, show all work.

1. (28pts) The following problems are not related. Show all work.
   
   (a)(20pts)(i)(10pts) Express as a polynomial: \((3x - 1)(x + 2) + 7x(x + 1)\).
   
   (ii)(10pts) Simplify the expression: \((3x + 2)^{1/3}(2)(4x - 5)(4) + (4x - 5)^2 (\frac{1}{2})(3x + 2)^{-2/3}(3)\).
   
   (b)(8pts) Use the quadratic formula to solve the equation: \(1 + 3x^2 = -5x\).

2. (24pts) The following problems are not related. Show all work.
   
   (a)(10pts) Solve the equation \(36x^4 - 13x^2 + 1 = 0\). Show all work.
   
   (b)(10pts) Factor the polynomial completely: \(x^5 - 4x^3 + 8x^2 - 32\) \(\text{[Hint: } a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)\]\)
   
   (c)(4pts) Which of the choices below is the equivalent to \(\frac{x}{x + 2} - \frac{4}{x + 2} \div \frac{x}{x - 3} - \frac{6}{x + 2}\)? Choose only one answer. No justification necessary, copy down the entire answer. If you do not copy down the entire answer, points will be deducted.
   
   \(\text{(A) } \frac{x - 4}{x - 9} \quad \text{(B) } \frac{1}{x + 3} \quad \text{(C) } \frac{x - 4}{x^2 - x} \quad \text{(D) } \frac{1}{x - 4} \quad \text{(E) None of these}\)

PROBLEMS #3 & #4 ON THE OTHER SIDE
3. (20pts) The following problems are not related. Show all work.

(a) (10pts) Find all solutions of the equation \(2 \sin^2(\theta) = 1 - \sin(\theta)\) that are in the interval \(0 \leq \theta \leq 2\pi\).

(b) (10pts) (i) (2pts) What is the domain of \(f(x) = \frac{x}{x^2 - 2}\)? Give your answer in interval notation.

(ii) (8pts) Write down the piecewise definition of the function \(f(x) = \frac{x}{x^2 - 2}\).

4. (28pts) The following problems are not related. Show all work. Simplify your answers.

(a) (12pts) Use the formula \(\tan(u - v) = \frac{\tan(u) - \tan(v)}{1 + \tan(u)\tan(v)}\) to find \(\tan\left(\frac{5\pi}{12}\right)\). (Use \(\frac{5\pi}{12} = \frac{3\pi}{4} - \frac{\pi}{3}\).)

(b) (12pts) If \(\csc(\phi) = -\frac{4}{3}\), find the exact value of \(\tan(\phi)\) where \(\frac{3\pi}{2} < \phi < 2\pi\).

(c) (4pts) Which of the choices below is the solution of the equation \(\sec(\beta) = 2\) where \(-\pi \leq \beta \leq \pi\)? Choose only one answer. No justification necessary, copy down the entire answer. If you do not copy down the entire answer, points will be deducted.

(A) \(-\frac{\pi}{6}, \frac{\pi}{6}\)  (B) \(\frac{\pi}{3}, \frac{5\pi}{3}\)  (C) \(\frac{2\pi}{3}, \frac{4\pi}{3}\)  (D) \(-\frac{\pi}{3}, \frac{\pi}{3}\)  (E) None of these