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.**

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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: $(3x+2)^{1/3}(2)(4x-5)(4)+(4x-5)^2\left(\frac{1}{3}\right)(3x+2)^{-2/3}(3)$.

   (b)(8pts) Use the *quadratic formula* to solve the equation: $1+3x^2=-5x$.

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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: $x^5-4x^3+8x^2-32$ $\left[\textit{Hint: } a^3\pm b^3=(a\pm b)(a^2\mp ab+b^2)\right]$

   (c)(4pts) Which of the choices below is the equivalent to $\dfrac{\dfrac{x}{x+2}-\dfrac{4}{x+2}}{x-3-\dfrac{6}{x+2}}$? **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.*

   (A) $\dfrac{x-4}{x-9}$ (B) $\dfrac{1}{x+3}$ (C) $\dfrac{x-4}{x^2-x}$ (D) $\dfrac{1}{x-4}$ (E) None of these

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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 $f(x) = \left|\dfrac{x}{x^2-2}\right|$? Give your answer in <u>interval notation</u>.

(ii) (8pts) Write down the <u>piecewise</u> definition of the function $f(x) = \left|\dfrac{x}{x^2-2}\right|$.

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

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

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

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

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

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