

**You may keep this page of questions.** Turn in your answers with all of your work on the green paper and ivory colored paper. You are **NOT** allowed to use calculators on questions #1 – 7. Work these questions on the green paper. After you have finished these first seven questions, turn in the first part of the exam and receive a page of ivory colored paper to use for question #8. You will need to use your calculator on the second part of question #8.

(1) 12 Points. Find an equation for the straight line which passes through the points  $(-2, 1)$  and  $(3, -1)$ . Express your final answer in the form  $Ax + By = C$  where  $A, B$  and  $C$  are integers and  $A \geq 0$ .

(2) 8 Points. Perform the following multiplication of complex numbers and express the answer in the form  $a + bi$ .

$$(3 + 2i)(5 - i)$$

(3) 10 Points. Find an equation for the circle which has center  $(-1, 3)$  and radius  $\sqrt{10}$ .

(4) 10 Points. Solve the inequality  $|x - 5| > \frac{1}{2}$ . Express the answer both using inequality notation and also using interval notation.

(5) 10 Points. Find  $f^{-1}(x)$  if  $f(x) = \sqrt[3]{2x + 7}$ .

(6) 10 Points. Divide  $6x^2 - x - 4$  by  $3x + 2$  to find a quotient and a remainder.

(7) For all parts of this question, let  $f$  be the piecewise-defined function given by

$$f(x) = \begin{cases} x^2 - 4x + 5 & \text{if } x > 1 \\ -x - 2 & \text{if } 0 \leq x \leq 1 \\ -1 + \frac{1}{x-1} & \text{if } x < 0 \end{cases}$$

(a) 12 Points. Graph  $y = f(x)$ .

(b) 2 Points. Where, if anywhere, is  $f$  discontinuous?

(c) 2 Points. Is  $f$  an even function?

(d) 2 Points. Is  $f$  one-to-one?

(e) 4 Points. On what interval or intervals is  $f$  increasing?

(f) 4 Points. Graph the equation  $y = 3 + f(x + 2)$ .

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(8a) 10 Points. A rectangular container measuring 2 feet by 4 feet by 5 feet is covered with an additional layer of lead shielding which has a uniform thickness of  $x$  feet. Find the volume  $V$  of the lead shielding as a function of the thickness  $x$  of the shielding. [Hints: (i) You **don't** need your calculator for this part. (ii) Find the volume  $V$  of the shielding as the difference between the volumes of two rectangular solids.]

(8b) 6 Points. Find the thickness of the lead shielding if the volume of the shielding is 8.500 cubic feet. You will need your calculator for this part but there are several ways that you might reasonably use your calculator to answer this question.