

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

(1) 12 Points. Find an equation for the straight line which passes through the points $(-3, 2)$ and $(-1, -5)$. 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 division of complex numbers and express the answer in the form $a + bi$.

$$\frac{4 + 3i}{2 - i}$$

(3) 10 Points. Find $f^{-1}(x)$ if $f(x) = 3^x - 7$.

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

$$f(x) = \begin{cases} 2^x & \text{if } x < 0 \\ \sqrt{x} & \text{if } 0 \leq x \leq 4 \\ 6 - x & \text{if } x > 4 \end{cases}$$

(a) 12 Points. Graph $y = f(x)$. **Mark scales on axes!**

(b) 4 Points. Where, if anywhere, is f discontinuous?

(c) 2 Points. Is f one-to-one?

(d) 6 Points. Graph the equation $y = -2f(x - 3)$. **Mark scales on axes!**

(5) 10 Points. (a) Rewrite $\log_b 7 = 5$ as an exponential equation.

(b) Rewrite $2^n = w$ as a logarithmic equation.

(6) 12 Points. Given that $\log_b 2 = 3.56$, $\log_b 3 = 5.64$, $\log_b 5 = 8.26$ and $\log_b 7 = 9.99$, use these (and the laws of logarithms) to calculate:

$$\text{(a) } \log_b \frac{21}{\sqrt{5}} \quad \text{(b) } \log_b(1^2 + 2^2 + 3^2)$$

(7) 12 Points. Solve $\log_2(4x + 1) - \log_2(2x - 5) = 3$.

(8) 12 Points. The population of a certain small country was 1.838 million in 1989 and was 2.071 million in 2002. Assuming an exponential model for population growth, what will the country's population be in 2050?