

name (printed)

student number

**I have read and understood
the instructions below:**

signature

Instructions:

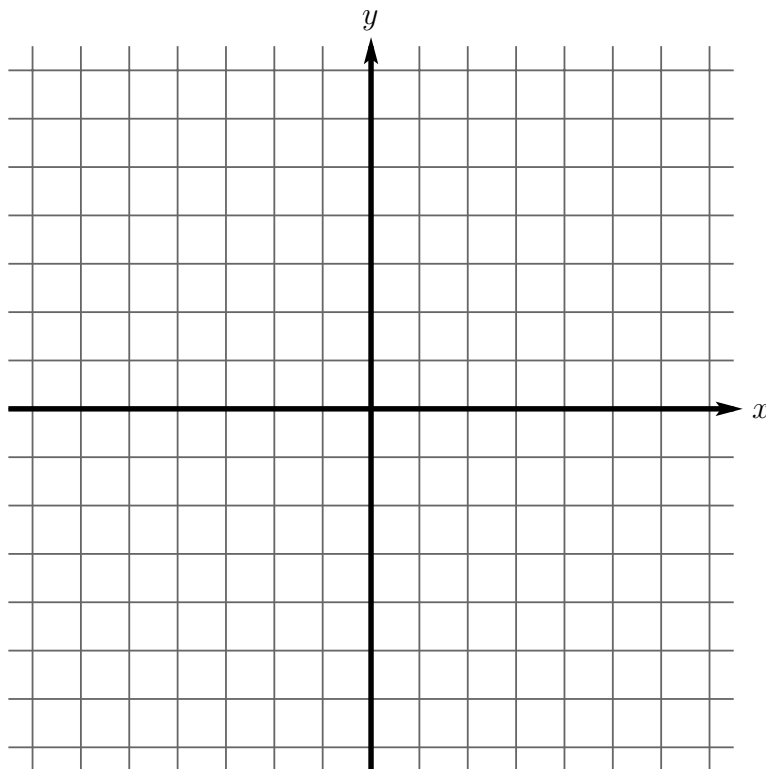
1. No notes or books are to be used in this test. If you need scrap paper please ask and some will be provided.
2. A non-programmable, non-graphing calculator is permitted.
3. There are 6 pages (including this cover page) in the test. Justify every answer, and clearly show your work. Unsupported answers will receive no credit.
4. You will be given 50 minutes to write this test. Read over the test before you begin.
5. At the end of the test you will be given the instruction "Put away all writing implements and remain seated." *Continuing to write after this instruction will be considered as cheating.*
6. **Academic dishonesty:** Exposing your paper to another student, copying material from another student, or representing your work as that of another student constitutes academic dishonesty. Cases of academic dishonesty may lead to a zero grade in the test, a zero grade in the course, and other measures, such as suspension from this university.

Question	value	score
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

Question 1:

(a)[5 points] Let $f(x) = \frac{2x - 1}{2x + 1}$. (Note that $f(x)$ is one-to-one.) Find $f^{-1}(x)$ and state its domain and range.

(b)[5 points] Graph $g(x) = 2^x$ and $g^{-1}(x) = \log_2 x$ on the same set of axes below:



Question 2

(a)[3 points] Use your calculator to find $\log_2 2.2$ (round your answer to three decimal places.)

(b)[3 points] Solve

$$5^{2-x} = 25^{5x}$$

(c)[4 points] Write as a single logarithm and simplify:

$$3 \log(xy) - 2 \log(x^2) + \log(1/y)$$

Question 3

(a)[5 points] Solve

$$\log_3(x - 3) + \log_3(x + 3) = 3$$

(b)[5 points] Solve

$$\ln(x^{\ln x}) = 4 \ln x$$

Question 4

(a)[5 points] Recall that carbon-14 has a half-life of 5750 years, and that the function which models the amount of carbon-14 remaining in dead plant matter t years after death is $P(t) = P_0 e^{-kt}$, where P_0 is the amount of carbon-14 present at time of death and $k = 0.0001205$.

On Monday British archaeologists announced they have uncovered an extensive Neolithic settlement near Stonehenge in England. Wood artifacts at the site were found to contain 57% of the carbon-14 of living wood. Approximately how old is the settlement? Round your answer to the nearest year.

(b)[5 points] An investment account is growing according to the balance function $B(t) = B_0 e^{kt}$, where B_0 is the initial investment balance, and k is the rate of interest (compounded continuously). Find k if \$500 grows to \$700 in four years, and also find the doubling time of the investment.

Question 5

(a)[5 points] Suppose $\sec \theta = \sqrt{7}$ where θ is acute. Find the values of the five other trigonometric ratios for the angle θ .

(b)[5 points] Give the exact value of

$$\sin(45) \cos(30) \tan(60)$$