University of California, San Diego
Department of Mathematics

Instructions: Turn off and put away your cell phone. No calculators or electronic devices are allowed. You may use one page of notes, but no books or other assistance. Show all of your work; no credit will be given for unsupported answers. No credit will be given for illegible solutions.

1. Find all numbers x that satisfy the equation: $2\ln(x) = \ln(x+2)$.   (6)

2. A function f has exponential growth. If $f(1) = 2$ and $f(2) = 3$, then what is $f(3)$?   (6)

3. The substance *trigonometrium* is highly radioactive and decays as time passes. Suppose that the amount   (6) $A(t)$ of *trigonometrium* at time t is given by the formula

$$A(t) = 50e^{-5t}.$$

What is the half-life of *trigonometrium*?
(Your solution must be exact. Answers may include a logarithmic function.)

4. Find two real numbers that have sum 12 and product 30.   (7)

5. Evaluate the following: (8)
    (a) $\cos\left(\dfrac{\pi}{3}\right)$
    (b) $\sin\left(\dfrac{5\pi}{2}\right)$
    (c) $\cos\left(-\dfrac{3\pi}{4}\right)$
    (d) $\sin(8\pi)$

6. Suppose $\frac{\pi}{2} < \theta < \pi$ and suppose $\sin\theta = \frac{3}{5}$. Evaluate $\cos\theta$.   (7)