UC Berkeley
Department of Mathematics
Math 32– Midterm 2 Jeff Hicks

Name:

UID:

- Please do not turn over this page until instructed to do so.

- This exam contains 7 problems, of which we will score 6 problems. Indicate to us which 6 problems you would like us to grade by checking the small box at the top of the page. We will only grade 6 problems. Each problem is worth 10 points, for a total score of 60 points on this exam.

- There are no notes or calculators allowed during the examination.

- Should you finish during the last 15 minutes of the exam period, please remain seated *until we have collected all of the exams* as other students will still be working.

- Solutions without work shown may not receive full credit. Box the solution you would like us to grade on each problem.

- This exam contains 8 pages (including this page.)

1. Using that constants x and y satisfy $\log_2(x) = \frac{1}{2}$, and $\log_2(y) = \frac{1}{3}$, simplify each of the following expressions to a number.

   (a) (1 point) $\log_2(16)$

   (b) (2 points) $\log_2(x \cdot y)$

   (c) (3 points) $\log_2(x^3)$
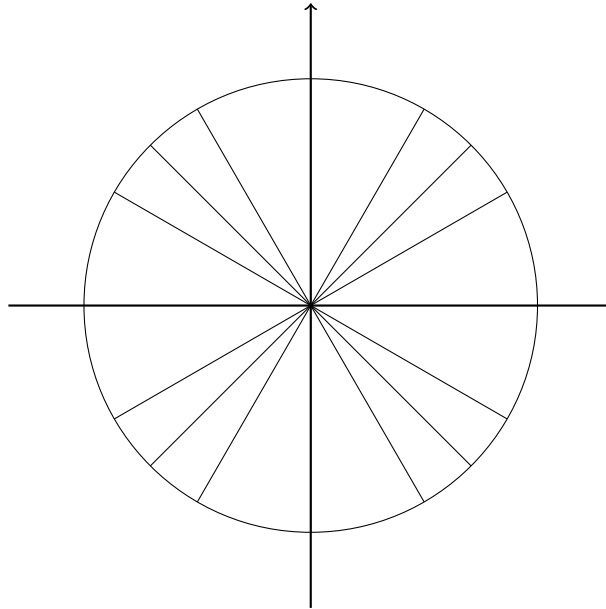
   (d) (4 points) $\log_2\left(\frac{4x}{y}\right)$.

2. (a) (2 points) Calculate $\ln(e^2)$.

(b) (4 points) Estimate $5 \cdot e^{0.002}$.

(c) (4 points) Estimate $\ln(.992)$.

3. Mark the location of the following angles on the unit circle. All measures are in radians.

   (a) (1 point) $\theta = \pi/4$

   (b) (2 points) $\theta = -\frac{2\pi}{3}$

   (c) (2 points) $\theta = \frac{8\pi}{3}$.

   (a) (2 points) What is the y-coordinate of the angle marked in part b.

   (b) (3 points) What are the values of $\cos\left(\frac{-\pi}{4}\right)$ and $\tan\left(\frac{-\pi}{4}\right)$.

4. Solving for Tan and Cos from Sin

   (a) (5 points) Suppose that $\sin(\theta) = \frac{1}{3}$ and $0 \leq \theta \leq \pi/2$. Compute $\tan(\theta)$.

   (b) (2 points) What is $\sin(\theta) - \sin(\theta + 4\pi)$?

   (c) (3 points) Suppose as before that $\sin(\theta) = \frac{1}{3}$. What is $\cos(\frac{\pi}{2} - \theta)$?

5. Let P be a principal investment of $ 400 dollars, invested at the start of 2019 with a 5 percent interest rate.

   (a) (2 points) Calculate how much the investment will accrue after 2 years if the interest is not compounded.

   (b) (5 points) Calculate how much the investment will accrue after 2 years if the interest is compounded yearly.

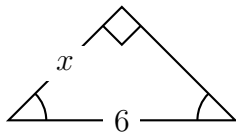   (c) (3 points) Estimate how long it will take to become $ 800 if continuously compounded at 5 percent interest.

6. (a) (2 points) Compute $\tan(\theta)$ for the triangle drawn below.
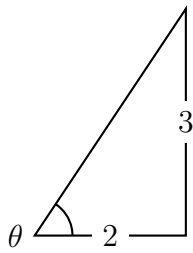
(b) (5 points) Given that $\tan(x) = 3$, find the length H.
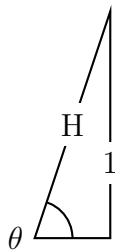
(c) (3 points) On this isosceles right triangle, determine the length of the side x.

7. (10 points) Given that $\log_3(x) = 2.5$, find the base b so that $\log_b(x) = 5$.