Practice Problems - Exam 2 (Due Tue, May 27)

Math 1060Q – Summer 2014

Professor Hohn

1. True or false.

   (a) $\dfrac{\ln 8}{\ln 2} = 4$

   (a) _____

   (b) $\cos\left(\dfrac{\pi}{3}\right) = \cos\left(\dfrac{5\pi}{3}\right)$

   (b) _____

   (c) $\sin(x+y) = \sin(x) + \sin(y)$

   (c) _____

   (d) $(\log_9 3)\left(\log_5 \dfrac{1}{25}\right) = -1$

   (d) _____

   (e) $f(\theta) = \cos\theta$ is an even function.

   (e) _____

2. Show that $2 - \log x = \log\left(\dfrac{100}{x}\right)$ for every positive x.

3. Let $f(x) = \dfrac{3x^2 + 4x + 1}{2x^2 - 4x + 2}$. Find the vertical asymptotes, end behavior, holes, and zeros of $f(x)$. Sketch $f(x)$.

4. Find the smallest possible positive number x such that $16\sin^4 x - 16\sin^2 x + 3 = 0$.

5. Find all numbers x such that $\dfrac{\ln(11x)}{\ln(4x)} = 2$.

6. Suppose a colony of 100 cells of the bacteria Precalcitis quadruples in size every two hours.
   (a) Find a function that models the population growth of the colony of bacteria.

   (b) Approximately how many cells will be in the colony after five hours.

7. Find all numbers x that satisfy $\log_3(x+5) + \log_3(x-1) = 2$.

8. Suppose a 19-foot ladder is leaning against a wall, making a 60° angle with the ground. How high up the wall is the end of the ladder?

9. Suppose y is a number such that $\tan y = -\frac{2}{9}$. Evaluate $\tan(-y)$.

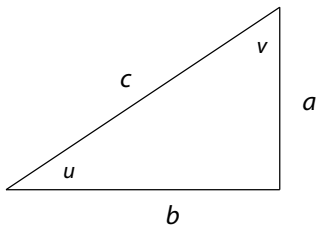
10. Create a table showing the endpoints of the radius of the unit circle corresponding to the angles $\frac{3\pi}{2}$, $\frac{5\pi}{3}$, $\frac{7\pi}{4}$, and $\frac{11\pi}{6}$.

11. Show that

$$\sin^2\theta = \frac{\tan^2\theta}{1+\tan^2\theta}$$

for all θ except odd multiples of $\frac{\pi}{2}$.

12. Use the figure to the right to solve the following:



Suppose $a = 5$ and $b = 8$. Evaluate

(a) $\sin u$

(b) $\cot u$

(c) $\sec v$

13. Suppose $-\frac{\pi}{2} < \theta < 0$ and $\tan\theta = -3$. Evaluate

(a) $\cos\theta$

(b) $\sin\theta$

14. Find the smallest number x such that $\tan e^x = 0$.

15. Suppose $-\dfrac{\pi}{2} < x < 0$ and $\cos x = \dfrac{5}{9}$. Evaluate $\sin x$ and $\tan x$.

16. Find exact values for the following

(a) $\sin(-\frac{3\pi}{2})$

(b) $\cos\frac{15\pi}{4}$

(c) $\cos 360045^\circ$

(d) $\sin 300^\circ$

17. Suppose an ant walks counterclockwise on the unit circle from the point $(0, 1)$ to the endpoint of the radius that forms an angle of $\frac{5\pi}{4}$ radians with the positive horizontal axis. How far has the ant walked?

18. Let $f(x) = 3 - 5e^{2x}$.

(a) Find the domain of f.

(b) Find the range of f.

(c) Find a formula for f^{-1}.

(d) Find the domain of f^{-1}.

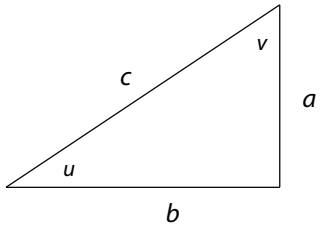
(e) Find the range of f^{-1}.

19. Suppose $\log_7 w = 3.1$ and $\log_7 z = 2.2$. Evaluate $\log_7 \left(\dfrac{49w^2}{z^3} \right)$.

20. Find all numbers x such that $e^{4x} - 9e^{2x} - 22 = 0$.

21. Use the figure to the right to solve the following:

Suppose $\cos u = \frac{2}{3}$. Evaluate $\cos v$.



22. Find a formula for the inverse of the function f defined by $f(x) = 7 - 3\log_4(2x - 1)$.