Practice Problems - Final: Part 3 (Due Fri, May 30)

Math 1060Q − Summer 2014

Professor Hohn

1. Simplify the expression $\left(\dfrac{(3t^9 w^{-5})^4}{(t^{-3}w^7)^5} \right)^{-2}$.

2. Suppose you go to the fair and decide to ride the Ferris Wheel. The Ferris Wheel has a 30 meter diameter and turns 3 revolutions per minute with its lowest point 1 meter off the ground. Assume your height h above the ground is a function of the form $h(x) = a\cos(bx + c) + d$, where $x = 0$ represents the lowest point on the wheel and x is measured in seconds. Find the values of $a > 0$, $b > 0$, c, and d.

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

4. Suppose $\frac{\pi}{2} < \theta < \pi$ and $\tan \theta = -4$. Evaluate

   (a) $\cos \theta$

   (b) $\sin \theta$

5. Find exact values for the following

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

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

(c) $\cos 360045°$

(d) $\sin 300°$
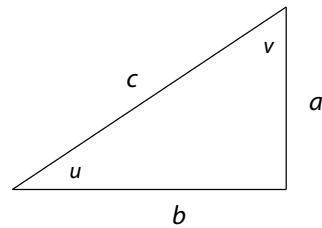
6. Use the figure to the right to solve the following:

Suppose $a = 3$ and $c = 8$. Evaluate

(a) $\cos v$

(c) $\tan v$

(b) $\sin v$

7. Evaluate $\cos(\cos^{-1} \frac{2}{5})$.

8. Find a number b such that $\cos x + \sin x = b \sin(x + \frac{\pi}{4})$.

9. Show that $\dfrac{\sin x}{1 - \cos x} = \dfrac{1 + \cos x}{\sin x}$ for every x that is not an integer multiple of π.

10. For $f(x) = \dfrac{x-1}{x^2+1}$ and $g(x) = \dfrac{x+3}{x+4}$, find the formulas for the following. Simplify your results as much as possible.
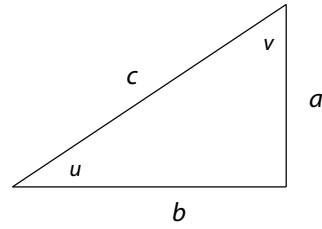
(a) $f \circ g$

(b) $g \circ f$

11. Evaluate the expression $\sin\left[\sec^{-1}\left(\frac{5}{3}\right) + \tan^{-1}\left(\frac{3}{4}\right)\right]$.

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

   Suppose $b = 3$ and $\sin v = \frac{1}{3}$.
   Evaluate a.

13. Let $g(x)$ be of the form $g(x) = a\cos(bx + c) + d$. Find the values for a, b, c, and d with $a > 0$, $b > 0$, and $0 \leqslant c \leqslant \pi$ so that g has range $[-3, 4]$, $g(0) = 2$, and g has period 5.