# Math 100 – WORKSHEET 8
# EXPONENTIAL AND TRIG FUNCTIONS

## 1. Exponentials

(1) Simplify
  (a) $\left(e^5\right)^3$, $\left(2^{1/3}\right)^{12}$, $7^{3-5}$.

  (b) $\log(10e^5)$, $\log(3^7)$.

(2) Differentiate:
  (a) $10^x$

  (b) $\frac{5 \cdot 10^x + x^2}{3^x + 1}$

## 2. Trigonometric functions

**Fact.** *When $x$ is measured in **radians**, we have $(\sin x)' = \cos x$, $(\cos x)' = -\sin x$*

(3) (Special values) What is $\sin \frac{\pi}{3}$? What is $\cos \frac{5\pi}{2}$?

(4) Derivatives of trig functions
  (a) Interpret $\lim_{h \to 0} \frac{\sin h}{h}$ as a derivative and find its value.

  (b) Differentiate $\tan \theta = \frac{\sin \theta}{\cos \theta}$.

(5) What is the equation of the line tangent the graph $y = T \sin x + \cos x$ at the point where $x = \frac{\pi}{4}$?

## 3. FUNCTIONS IN CHAINS

(6) Write each function as a composition

    (a) $e^{3x}$

    (b) $\sqrt{2x + 1}$

    (c) (Final, 2015) $\sin(x^2)$

    (d) $(7x + \cos x)^n$.