

YOUR NAME: _____

CIRCLE YOUR TA's NAME: Mr. Ye Fang Ms. Shantala Mukherjee

Do all five problems. Each part is worth the indicated number of points. There are 100 points altogether. Do not spend too much time on any one problem. There are seven printed pages in this exam, including this cover page.

Page	Possible points	Your score
Page 2	16	
Page 3	16	
Page 4	18	
Page 5	16	
Page 6	16	
Page 7	18	
TOTAL	100	

Problem 2 Suppose that $\sin(x) = \frac{5}{13}$ and $\cos(x) = -\frac{12}{13}$.

(a) (5 points) Find the exact value of $\cos\left(x + \frac{\pi}{3}\right)$.

(b) (5 points) Find the exact value of $\sin\left(x - \frac{\pi}{4}\right)$.

(c) (6 points) Find the exact value of $\tan\left(x + \frac{\pi}{2}\right)$.

Problem 4

- (a) (8 points) Find all the solutions to the equation

$$\sin(x) \tan(x) = 5 \tan(x).$$

- (b) (8 points) Find all the solutions to the equation

$$\cos^2(t) - \sin^2(t) = \cos(t)$$

which lie in the interval $0 \leq t \leq 2\pi$.

Problem 5 (16 points) A radio tower is 1500 feet tall. A supporting wire attached to the top of the tower makes an angle of 68° with the level ground. Answer the following questions. (Your answers can involve trigonometric or inverse trigonometric functions. Do not try to evaluate them.)

(a) (6 points) How long is the wire?

(b) (6 points) How far from the base of the tower is the supporting wire attached to the ground?

(c) (6 points) If a second supporting wire also runs from the top of the tower to the level ground and is twice as long as the first, what angle does it make with the ground?