

# Homework Section 3.3 - Due 18:00 Friday 30th Sep

**There are envelopes outside my office for you to drop off this homework by Friday, make sure you put it in the correct section!**

1. #8 on page 126.
2. #38 on page 126.
3. #64 on page 127.
4. Compute the *exact* surface area and the circumference of
  - (a) unit circle.
  - (b) circle of radius 2.
  - (c) circle of radius 3.

\*Using the above information, explain *quantitatively*, how the surface area and circumference changes, when the radius changes.

5. We know that on the unit circle the absolute value of  $x$  and  $y$  is *at most* 1. Using the identity

$$\tan \theta = \frac{\sin \theta}{\cos \theta},$$

explain why  $|\tan \theta| \geq |\sin \theta|$  is always true on the unit circle.

For what values of  $\theta$  is  $\tan \theta = \sin \theta$ ?

Is it true for any radius  $r$ ? If true, explain why. If false, give an angle  $\theta$  that is false.

- \*6 Recall that using the identity  $\sin^2 s + \cos^2 s = 1$ , we can derive the identities:

$$1 + \cot^2 s = \csc^2 s \quad \text{and} \quad \tan^2 s + 1 = \sec^2 s$$

(if you don't remember how, you should try it yourself)

- (a) For what values of  $s$  is  $\cot s = 0$ ? (Hint: There are infinitely many)
- (b) If  $\cot s = 0$ , what are the possible values of  $\csc s$ ?
- (c) For what values of  $s$  does  $\tan^2 s$  tend towards  $\infty$ ? How about for  $\sec^2 s$  tend towards  $\infty$ ?

\*Optional questions, not to be handed in.