Homework Section 3.3 - 23rd May

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 θ is $\tan\theta = \sin\theta$?
   Is it true for any radius r? If true, explain why. If false, give an angle θ 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 ∞? How about for $\sec^2 s$ tend towards ∞?

*Optional questions, not to be handed in.