MA 166 Practice Test 3

1. Concept check and true-false questions (p. 571 1-4; p. 580 1-2, p. 591 1-5; p. 640 1-5d); p. 640 True-False Quiz, 1-4, 7, 9, 12-15)

2. a) Find the Cartesian equation of the polar curve $r = 3\cos\theta$ and sketch its graph. What is the curve?

   b) Find the equation of the tangent line to the curve at the point specified by $\theta = \pi/3$.

3. Find the area of the region that lies inside the curve $r = 1 + \cos\theta$ and outside $r = 3\cos\theta$.

4. Determine whether the **sequence** is convergent or not, and if it is, find its limit.

   (a) $a_n = \dfrac{\sin n}{n}$ (b) $a_n = \ln(2n+1) - \ln(n+1)$ (c) $a_n = \dfrac{\ln(n^2+1)}{n}$

5. Determine whether the **series** converges or diverges. If it converges find its sum.

   (a) $\displaystyle\sum_{n=1}^{\infty}\left[\sin\left(\frac{1}{n}\right) - \sin\left(\frac{1}{n+1}\right)\right]$;

   (b) $\displaystyle\sum_{n=1}^{\infty}\frac{n^2-1}{3n^2+n-1}$;

   (c) $\displaystyle\sum_{n=1}^{\infty}\frac{2^n+3^n}{6^n}$.

6. What is the value of c if $\displaystyle\sum_{n=2}^{\infty}(1+c)^{-n} = 2$?

7. Determine whether the **series** is convergent or divergent. Explain which test you use.

   (a) $\displaystyle\sum_{n=1}^{\infty}\frac{\sin^2 n}{n\sqrt{n}}$ (b) $\displaystyle\sum_{n=1}^{\infty}\sin\left(\frac{1}{n}\right)$ (c) $\displaystyle\sum_{n=2}^{\infty}\frac{1}{n\ln n}$

8. Estimate $\displaystyle\sum_{n=1}^{\infty} n^{-3/2}$ to within 0.01.