Oblig 1

Oskar Idland

Problem 1

a)

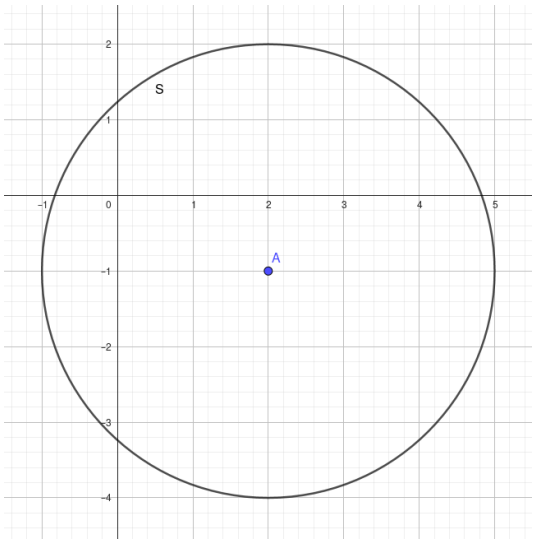

Figure 1: Curve: $\{z \in \mathbb{C} : |z| = 1\}$. Function: $f(z) = 3(z + 2 - i)$

b)

c)

d)

Problem 2

a)

We begin with the convergence test.

$$\lim_{n\to\infty} \left| \frac{a_{n+1}}{a_n} \right| < 1$$

$$\lim_{n\to\infty} \left| \frac{3^n (z+4-2i)^{2n+2}}{3^{n+1}(z+4-2i)^{2n}} \right| = \lim_{n\to\infty} \left| \frac{(z+4-2i)^2}{3} \right| < 1$$

$$\lim_{n\to\infty} |z+4-2i| < \sqrt{3}$$

b)

$$\lim_{n\to\infty} \left| \frac{(z-3+i)\,(n^2+2n)}{(n+1)^2+4n^2} \right| = \lim_{n\to\infty} \left| \frac{(z-3+i)(n^2+2n)}{n^2+2n+1+4n^2} \right|$$

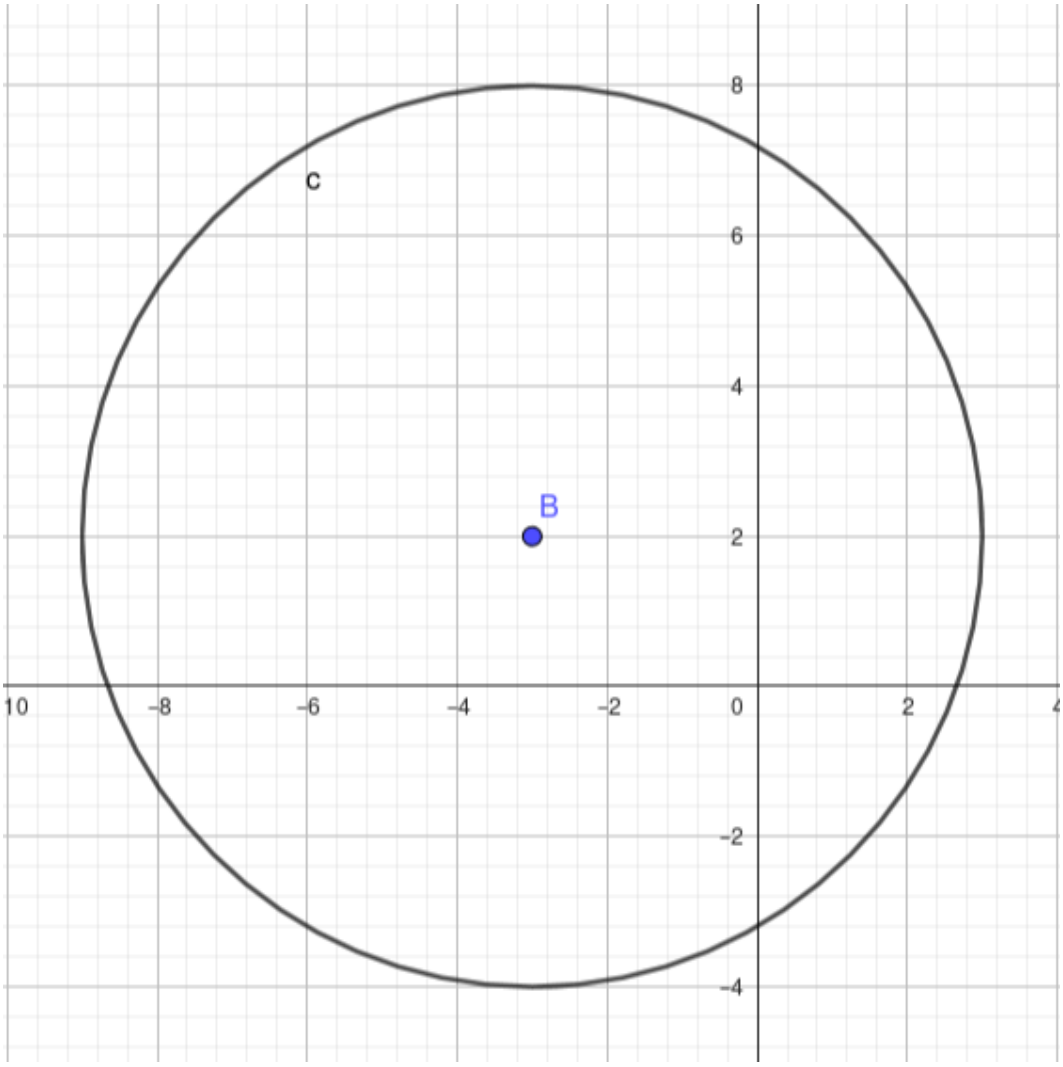

Figure 2: $z - 3 + 2i$ represents a circle with center at $(-3, 2)$. $|z|$ can have values from 1 to 3

c)

$$\lim_{n\to\infty} \left| \frac{\ln(n+1)nz^{n+1}}{\ln(n)z^n(n+1)} \right| = \lim_{n\to\infty} \left| \frac{\ln(n+1)nz}{\ln(n)(n+1)} \right| < 1$$

Problem 3

a)

b)

c)