Honors Pre-calculus: Polar Coordinates and Complex Numbers

§§ 11.1 – 11.4 Assignments

§ 11.1 Polar Coordinate System: Conversions: Rectangular ↔ Polar; Polar graphs

Polar coordinates \((r, \theta)\) where \(r\) = distance from the pole (origin \((O)\)) to the point \((P)\) and \(\theta = \angle\) measured counterclockwise from the polar axis (x-axis) to the terminal ray \(\overrightarrow{OP}\) (in radians or degrees)

Conversions: \(r = \pm \sqrt{x^2 + y^2}\) \hspace{1cm} \(\theta = \tan^{-1}\left(\frac{y}{x}\right)\)

\[ x = r \cos \theta \hspace{1cm} y = r \sin \theta \]

Read pp. 395 – 399
Do pp. 400 – 401 # 1 – 21 odd, 25, 29, 33

§ 11.2 Polar Form of Complex Numbers (\(r \text{ cis } \theta\)), Geometric Representation of Complex Numbers, Argand diagram, imaginary (vertical) axis, absolute value of complex number; Product of Complex Numbers in Polar

Read pp. 403 – 405
Do p. 406 # 1 – 21 odd

§ 11.3 Powers of Complex Numbers; De Moivre’s Theorem

Read pp 407 – 409
Do p. 410 # 1, 3b, 5, 7, 13

§ 11.4 Roots of Complex Numbers

Read pp. 412 – 413
Do pp. 413 – 414 # 1, 3, 6, 9, 11, 14

TEST §§ 11.1 – 11.4
Limaçons, roses, and cardioids are examples of classical curves. The classical curves are summarized in the chart below.

<table>
<thead>
<tr>
<th>Curve</th>
<th>rose</th>
<th>lemniscate (pronounced lehm NIH kuh)</th>
<th>limaçon (pronounced leh moh SOHN)</th>
<th>cardioid (pronounced KARD ee oyd)</th>
<th>spiral of Archimedes (pronounced ar KEE MEED ee)</th>
</tr>
</thead>
</table>
| Polar Equation | \( r = a \cos n\theta \)  
  \( r = a \sin n\theta \)  
  \( n \) is a positive integer. | \( r^2 = a^2 \cos 2\theta \)  
  \( r^2 = a^2 \sin 2\theta \) | \( r = a + b \cos \theta \)  
  \( r = a + b \sin \theta \) | \( r = a + a \cos \theta \)  
  \( r = a + a \sin \theta \) | \( r = a\theta \)  
  \( \theta \) in radians |
| General Graph | ![General Graph](笑脸) | ![General Graph](笑脸) | ![General Graph](笑脸) | ![General Graph](笑脸) | ![General Graph](笑脸) |