Peer Questions for Section 9.3

Read this material prior to class on Tues., Nov. 5, attempting to answer the questions below. In your group (minimum of two people per), discuss your responses to the following questions. Rotate (again) the role of ”group scribe”, a person who should submit your group’s responses, using the web form below, by 5 pm, Tues., Nov. 5.

1. True or False.

(a)  When converting from rectangular coordinates \((x, y)\) to polar ones \((r, \theta)\), there are always multiple correct answers.

(b)  When converting from polar coordinates \((r, \theta)\) to rectangular ones \((x, y)\), there are always multiple correct answers.

(c)  If you solve \(\tan \theta = y/x\) with \(x \neq 0\) by taking \(\theta = \arctan (y/x)\), this guarantees that \(\theta\) is an angle in Quadrants I or IV.

(d)  If you are converting a point with \(x \neq 0\) from rectangular to polar coordinates, you may choose \(\theta = \arctan (y/x)\) so long as you choose the appropriate sign for \(r = \pm \sqrt{x^2 + y^2}\).

(e)  If you are converting a point with \(x \neq 0\) from rectangular to polar coordinates, you may take \(r = \sqrt{x^2 + y^2}\) (i.e., make it positive), so long as you choose \(\theta\) so that both \(\cos \theta = \frac{x}{r}\) and \(\sin \theta = \frac{y}{r}\) are satisfied.

(f)  If your point to convert to polar coordinates is \((0, y)\) (that is, \(x = 0\), then you may take \(\theta = 0\).

(g)  When a rectangular equation (an equation in \(x\) and \(y\)) is solved so that \(y = f(x)\) (each \(x\)-value yields one unique \(y\)-value), the graph passes the vertical line test.

(h)  When a polar equation (an equation in \(r\) and \(\theta\)) is solved so that \(r = f(\theta)\) (each \(\theta\)-value yields one unique value of \(r\)), then the graph passes a radial line test in the sense that every ray emanating from the origin intersects the graph in at most one spot.

(i)  The equation \(r = -1\) is one of two ways to describe the unit circle in polar form.

(j)  The graph of a polar function \(r = f(\theta)\) looks different in the \(r\theta\)-plane than it looks in the \(xy\)-plane.

(k)  If you want to graph \(r = f(\theta)\) on a graphing calculator, it is not enough for the calculator to have just rectangular and parametric graphing modes; you must also have a polar graphing mode.

2. If you want to use Sage to plot a polar function \(r = f(\theta)\), say \(r = \sin^2(3\theta)\), in the \(xy\)-plane, you can do so using commands like these:
var('t')
polar_plot(sin(3*t)^2, (t, 0, 2*pi), color="red")

Plot this polar function. Look at the "petal" (thinking of the graph as being flower-shaped) in Quadrant I. Determine the location on that petal where there is a horizontal tangent line. Find, also, the location where the tangent line is vertical.

3. Identify one item (a concept, a step in an example, a statement, etc.) from this reading assignment you found difficult or confusing.