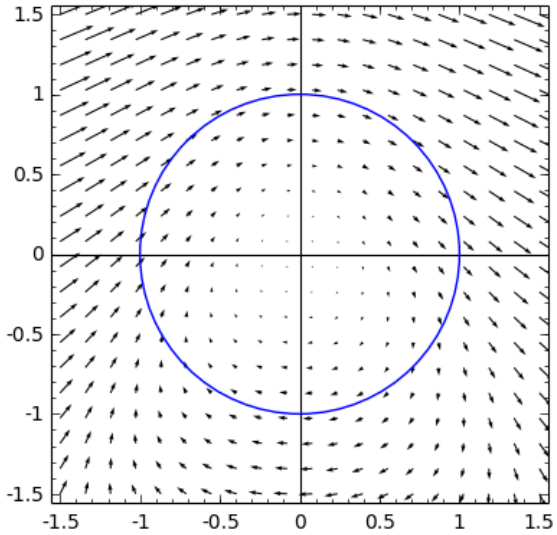
Full name: Math 2551, Section D___

Quiz 8 — §16.2,4

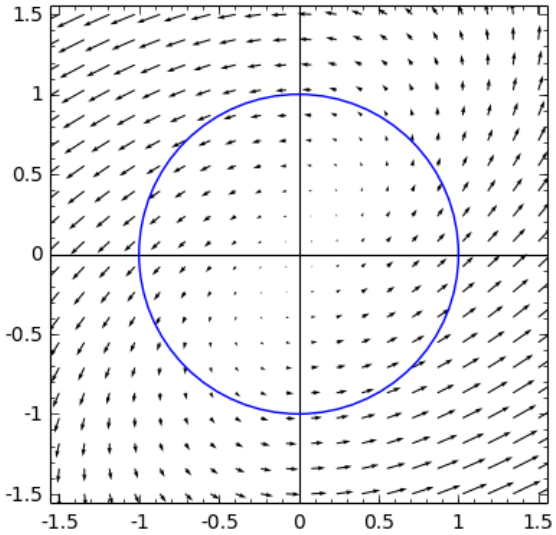
Please ***clearly*** show all work. Scientific calculators are allowed, but no graphing calculators!

(1) Let C be the unit circle in the xy-plane. Which of the following four vector fields has both a positive counterclockwise circulation along C and a positive outward flux across C? [4 points]

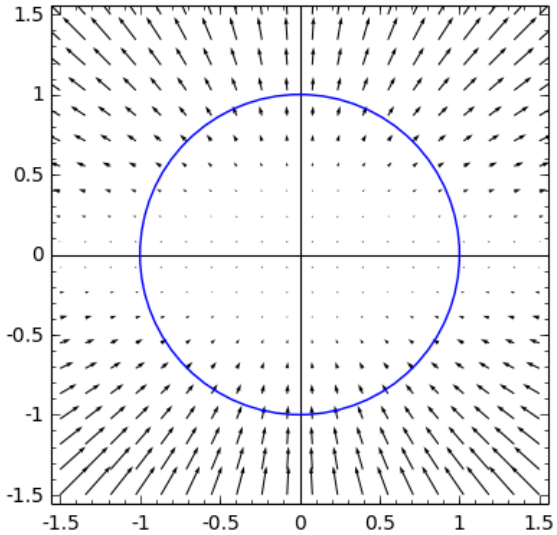
(a) $\mathbf{F}(x,y) = (y + x^2)\mathbf{i} - x\mathbf{j}$



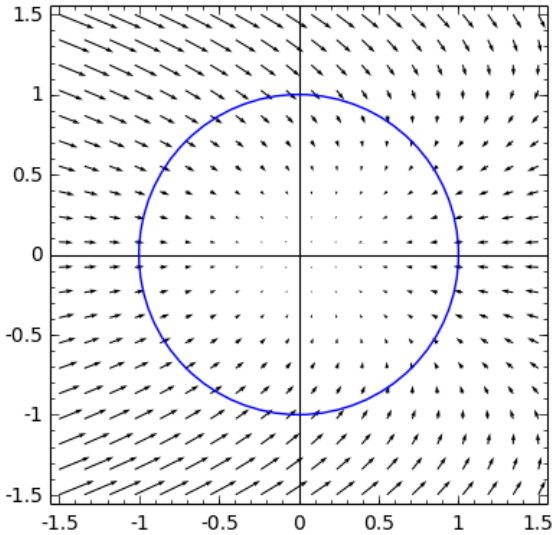
(b) $\mathbf{F}(x,y) = (x - y)\mathbf{i} + x\mathbf{j}$



(c) $\mathbf{F}(x,y) = xy\mathbf{i} + y^2\mathbf{j}$



(d) $\mathbf{F}(x,y) = (y^2 - x)\mathbf{i} - y\mathbf{j}$



(2) Check your answer in question (1) by actually computing the counterclockwise circulation along C and outward flux across C for the vector field you chose. [12 points]

(3) Let $\mathbf{F}(x, y) = e^{xy}\mathbf{i} + \sin(y)\mathbf{j}$. Suppose that C is a very small circle around the point (π, π) in the plane. Is the outward flux of $\mathbf{F}(x, y)$ across C positive, negative, or zero? You must explain your answer to receive credit. [4 points]