

Homework 12

Due April 29th by 12:30pm by email to kdatchev@purdue.edu. Justify your answers. Please let me know if you have a question or find a mistake.

1. Find the flux of $(\cos(z^3), e^{x^2z^2}, z)$ through the part of the surface $z = x^2 + y^2$ given by $z \leq 1$, oriented by the normal pointing upwards.
2. Find the flux of the vector field $(x, y)/(x^2 + y^2)$, outward through the following curves:
 - (a) the circle $x^2 + y^2 = R^2$ for some given $R > 0$,
 - (b) the circle $(x - 3)^2 + (y - 4)^2 = R^2$ for some given $R > 0$ with $R \neq 5$.
 - (c) an arc of the circle $x^2 + y^2 = R^2$ with angle θ for some given θ between 0 and 2π .
 - (d) the polynomial arc $x^2 + x^4y^6 + y^8 = 1$ with $x \geq 0$ and $y \geq x$.

Hint: Use Green's theorem to reduce (b) to (a) and (d) to (c). Remember your answers may (or may not) depend on the given parameters.