

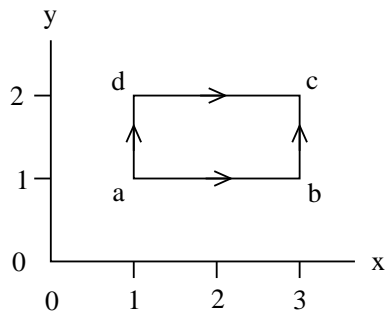
[tex168] Exact and inexact differentials III

Consider the differentials

$$dF_1 = \frac{\pi}{2} \left[\cos\left(\frac{\pi x}{2}\right) \sin\left(\frac{\pi y}{2}\right) dx - \sin\left(\frac{\pi x}{2}\right) \cos\left(\frac{\pi y}{2}\right) dy \right],$$

$$dF_2 = \frac{\pi}{2} \left[\cos\left(\frac{\pi x}{2}\right) \cos\left(\frac{\pi y}{2}\right) dx - \sin\left(\frac{\pi x}{2}\right) \sin\left(\frac{\pi y}{2}\right) dy \right].$$

- Show that dF_1 is inexact and dF_2 is exact.
- Calculate the integrals of dF_1 along paths abc and adc. The results are different, which is expected for an inexact differential.
- Calculate the integrals of dF_2 along paths abc and adc. The results must be equal for an exact differential.
- Find the function $F_2(x, y)$ of which the given dF_2 is its differential. This is done by integrating dF_2 from a chosen reference point, e.g. $(1, 1)$, to a generic point (x, y) . The choice of reference point enters the function $F_2(x, y)$ as an additive integration constant.
- Confirm that the results obtained in part (c) are equal to $F_2(3, 2) - F_2(1, 1)$, independent of the integration constant obtained in part (d).



Solution: