Selected solutions for worksheets from Math 53 (U.C. Berkeley's multivariable calculus course).

26. The Fundamental Theorem of Line Integrals

Questions

1.

Yes (there's only one component).

2.

Zero.

3.

(a) Yes

(b) No

0.0.1   5.

$g_1 = g_2 + K$ where K is some constant.

Problems

1.

(a) Yes, $f(x, y) = x^2 y + xy$.

(b) No (check $P_y \neq Q_x$).

(c) No (check $P_y \neq Q_x$).

(d) No (there'd have to be some $\hat{\mathbf{i}}$ term to get these $\hat{\mathbf{j}}$ and $\hat{\mathbf{k}}$ terms; alternately, take the curl).

2.

0

3.

(a) 2π

(b) $P_y = Q_x$

(c) No; D does not include the origin.

(d) No, since $\mathbf{F}$ cannot be a gradient.