Name: Chen Chen
UID: 004710308
Dis 2A

SECTION 2.6

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$$\frac{\partial(In(xy)+x^2y^3)}{\partial x}$$
$$\Rightarrow (\frac{1}{x}+2xy^3)dx$$
$$\frac{\partial(In(xy)+x^2y^3)}{\partial y}$$
$$\Rightarrow (\frac{1}{y}+3x^2y^2)dy$$
$$dF=(\frac{1}{x}+2xy^3)dx+(\frac{1}{y}+3x^2y^2)dy$$

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$$\frac{\partial(tan^{-1}(\frac{x}{y})+y^4)}{\partial x}$$
$$\Rightarrow (\frac{y}{x^2+y^2})dx$$
$$\frac{\partial(tan^{-1}(\frac{x}{y})+y^4)}{\partial y}$$
$$\Rightarrow (-\frac{x}{x^2+y^2}+4y^3)dy$$
$$dF=(\frac{y}{x^2+y^2})dx+(-\frac{x}{x^2+y^2}+4y^3)dy$$

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$$\phi(u,v)=\int \frac{2u}{u^2+v^2}du+g(v)$$
$$=In|v^2+u^2|+g(v)$$
$$\frac{\partial\phi}{\partial v}=\frac{2v}{v^2+u^2}+g'(v)$$
$$\Rightarrow g'(v)=0\Rightarrow g(v)=C$$
$$\phi(u,v)=In|v^2+u^2|+C$$