Math 273 | Quiz 9 | Name: ____________

18 Nov 2016 | Show appropriate work. | Point Values in $\boxed{\text{boxes}}$.

1. $\boxed{4}$ Let C be the line segment from $(3,-1)$ to $(-1,4)$. Evaluate

$$\int_C (x+y)\,ds.$$

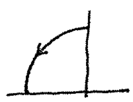
$\vec r(t) = \langle 3-4t, -1+5t\rangle \quad 0\le t\le 1$

$\vec r\,'(t) = \langle -4, 5\rangle$

$\|\vec r\,'(t)\| = \sqrt{41}$

$$\int_C (x+y)\,ds = \int_0^1 (3-4t-1+5t)\sqrt{41}\,dt = \int_0^1 (2+t)\sqrt{41}\,dt = \left(2t+\frac{t^2}{2}\right)\sqrt{41}\,\Big|_0^1 = \frac{5\sqrt{41}}{2}$$

2. $\boxed{4}$ Let C be the quarter unit circle from $(0,1)$ to $(-1,0)$ oriented in the counterclockwise direction. Evalute



$$\int_C \langle 4xy^2, 0\rangle \cdot d\mathbf{r}. = \int_{\pi/2}^{\pi} (-4\cos t\,\sin^3 t)\,dt$$

$$= -4\cdot\frac{\sin^4 t}{4}\Big|_{\pi/2}^{\pi} = 1 \;//$$

$\vec r(t) = \langle \cos t, \sin t\rangle \quad \frac{\pi}{2}\le\theta\le\pi$

$\vec r\,'(t) = \langle -\sin t, \cos t\rangle$

$\vec F(\vec r(t)) = \langle 4\cos t\,\sin^2 t, 0\rangle$

$\vec F(\vec r(t))\cdot\vec r\,'(t) = -4\cos t\,\sin^3 t + 0$

3. $\boxed{2}$ Use the Fundamental Theorem of Conservative Vector Fields to evaluate the line integral

$$\int_C \langle 2x, 2y\rangle \cdot d\mathbf{r} = f(1,-1) - f(0,1)$$

where C is given by $\mathbf{r}(t) = \langle t, \cos(\pi t)\rangle$ for $0 \le t \le 1$.

$$= 2 - 1 = 1 \;//$$

$\vec r(0) = \langle 0, 1\rangle$

$\vec r(1) = \langle 1, -1\rangle$

$f(x,y) = x^2 + y^2$