Vector Fields

For problems 1 and 2 find the gradient vector field for the given function.

1. $f(x,y)=\cos(1-4x)\sin\left(y^2+y^3\right)$

2. $f(x,y,z)=xy^2\ln(3x-4z)$

Parametric Curves

For problems 3 – 6 write down a set of parametric equations for the given curve as well as a range of the parameter *t* for which the curve will be traced out exactly once.

3. $\dfrac{x^2}{16}+\dfrac{y^2}{5}=1$

4. $x=y^2\sin(1-y),\ -1\le y\le 9$

5. The line segment that starts at (9,5) and ends at (-4, -12).

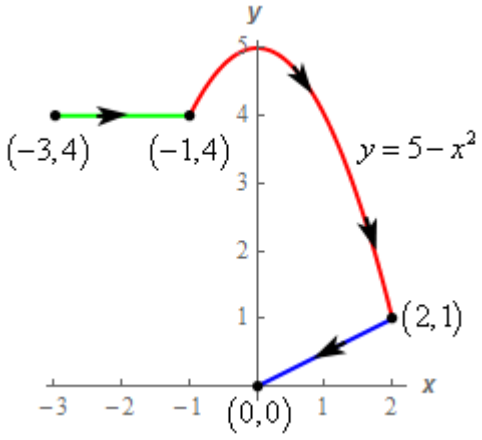
6. The line $y=6$ that starts at $x=35$ and ends at $x=7$.

Line Integrals, Part I

7. Evaluate $\int_C 6x\,ds$ over each of the following curves.

(a) *C* is the line segment from (-3,4) to (0,0).

(b) *C* is the curve shown below and for this problem you MUST follow the given orientation.



8. Evaluate $\int_C 2x^2-y\,ds$ where *C* is the left half of the circle $x^2+y^2=4$ with clockwise orientation.

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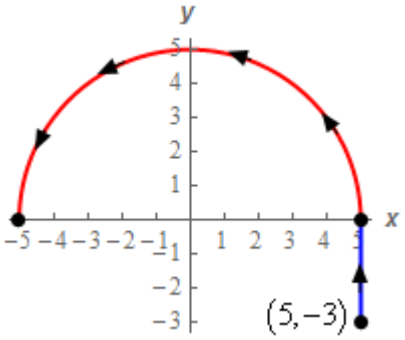
9. Evaluate $\int_C z\left(x^2-2y\right)ds$ where *C* is the curve given by $\vec{r}\left(t\right)=\left\langle 4,3-6t,2t\right\rangle,\ 0\le t\le 3$

Line Integrals, Part II

For problems 10 – 12 evaluate the line integral on he given curve.

10. $\int_C \sin\left(1+y\right)dy$ where *C* is the curve given by $y=\mathbf{e}^{2x},\ 0\le x\le \ln\left(4\right)$.

11. $\int_C x^2dy-\left(1-xy\right)dx$ where *C* is the line segment from (5,-3) to (5,0) and the upper portion of the circle $x^2+y^2=25$ with orientation as shown below.



12. $\int_C 12z^2\,dx+\left(x-y\right)dy-\left(4x+y-2z\right)dz$ where *C* is the line segment from (1,-4,2) to (-1,0 3).