Vector Fields

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

1. $f(x,y)=\left(6y-y^3\right)\mathbf{e}^{2-x^2}$

2. $f(x,y,z)=7xz^5\cos\left(y^2-x^2\right)$

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. $9x^2+\dfrac{y^2}{16}=1$

4. $x=y^5-y\sqrt{1+y},\ 7\le y\le 12$

5. The line segment that starts at (-5, 8) and ends at (-2, -6).

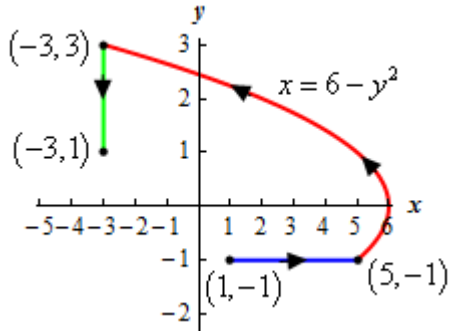
6. The line $y=10$ that starts at $x=-1$ and ends at $x=-19$.

Line Integrals, Part I

7. Evaluate $\int_C 8y\,ds$ over each of the following curves.

(a) *C* is the line segment from (1, -1) to (-3, 1).

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



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

9. Evaluate $\int_C 4z+x^2+8y\,ds$ where *C* is the curve given by $\vec{r}(t)=\langle 9t,2+4t,-7\rangle,\ 0\le t\le 4$

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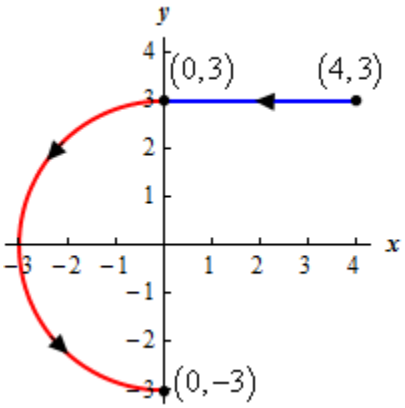
Line Integrals, Part II

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

10. $\int_C \cos(2+y)\,dy$ where *C* is the curve given by $y=\sqrt{x+1}$, $0\le x\le 3$.

11. $\int_C xy\,dx + x^2\,dy$ where *C* the line segment from (4, 3) to (0, 3) followed by the portion of the circle from (0, 3) to (0, -3) as shown below.



12. $\int_C (4x-y)\,dx - z^2\,dy - (x+y-4z)\,dz$ where *C* is the line segment from (2, 0, -1) to (5, 1, -2).