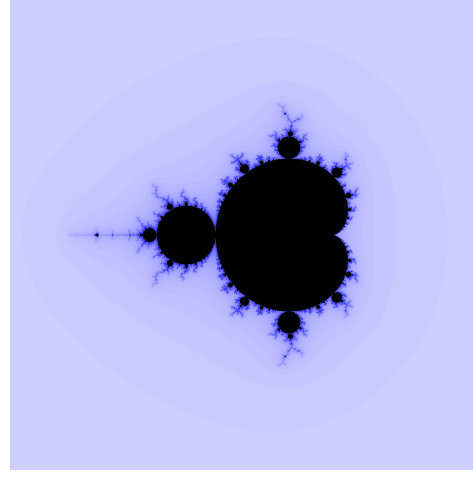
Announcement

2019 Sue Geller Undergraduate Lecture
Tuesday, March 19, 6:00–7:00pm in Blocker 117
Laura DeMarco of Northwestern University will speak on
"The Mandelbrot set: What we know today"



Exercises from yesterday

1. If the position vector $\vec{r}(t)$ of a moving particle equals $\langle 4\cos(t), 3\sin(t)\rangle$, find the velocity when $t = \pi/3$.
   [Exercise 16 in Appendix K.1. Answer: $\langle -2\sqrt{3}, 3/2\rangle$.]

2. If $x^2 + xy + y^2 = 3$, find the value of the second derivative y'' at the point on the graph where $x = 1$ and $y = 1$.
   [Exercise 36 in Section 3.5. Answer: $-2/3$.]

3. If $f(1) = 2$, $f(2) = 3$, $f'(1) = 4$, $f'(2) = 5$, $f'(3) = 6$, and $F(x) = f(x\,f(x\,f(x)))$, find $F'(1)$.
   [Exercise 74 in Section 3.4. Answer: 198.]

Notation for higher derivatives

$y = f(x)$

First derivative is y' or $f'(x)$ or $\dfrac{dy}{dx}$.

Second derivative is y'' or $f''(x)$ or $\dfrac{d^2y}{dx^2}$ or $\left(\dfrac{dy}{dx}\right)'$

Third derivative y''' or $y^{(3)}$ or $\dfrac{d^3y}{dx^3}$

Words from physics

$\vec{r}(t)$ is the position vector.

$\vec{r}'$ is velocity (a vector), and $|\vec{r}'|$ is speed (a scalar).

$\vec{r}''$ is acceleration

$\vec{r}'''$ is jerk