Quiz: For any complex number $a + bi$, you can compute that the solution to

$$z' = (a + bi)z, \qquad z(0) = 1$$

is:

$$e^{(a+bi)t} = e^{at}\left(\cos bt + i \sin bt\right).$$

The magnitude of $e^{(a+bi)t}$ is e^{at}, and the argument of $e^{(a+bi)t}$ is bt. When $a > 0$ and $b > 0$, we can think of $e^{(a+bi)t}$ as a point in the complex plane which traces out a path as t varies.

The curve in the complex plane traced out by

$$e^{(1+2\pi i)t}$$

most closely resembles which of the following?

Think about your answer and then look at the choices.

Choices:

a) A straight ray along the positive real axis

b) A circle with radius e and center at the origin

c) A circle with radius 1 and center at the origin

d) A spiral moving inwards and counterclockwise

e) A spiral moving outwards and counterclockwise

f) A spiral moving inwards and clockwise

g) A spiral moving outwards and counterclockwise

Pick what you think is the correct choice and then look at the answer.

Answer:
The magnitude of $e^{(1+2\pi i)t}$ is e^t and the argument is $2\pi t$, so the answer is (e).