

Metadata

Repo	sympy / sympy	Issue #s	[17006]
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Problem Statement

Using lambdify on an expression containing an identity matrix gives us an unexpected result:

```
>>> import numpy as np
>>> n = symbols('n', integer=True)
>>> A = MatrixSymbol("A", n, n)
>>> a = np.array([[1, 2], [3, 4]])
>>> f = lambdify(A, A + Identity(n))
>>> f(a)
array([[1.+1.j, 2.+1.j],
       [3.+1.j, 4.+1.j]])
```

Instead, the output should be `array([[2, 2], [3, 5]])` , since we're adding an identity matrix to the array. Inspecting the globals and source code of f shows us why we get the result:

```
>>> import inspect
>>> print(inspect.getsource(f))
def _lambdifygenerated(A):
    return (I + A)
>>> f.__globals__['I']
1j
```

The code printer prints `I` , which is currently being interpreted as a Python built-in complex number. Printer should support identity matrices ...

Test Patch

```
sympy/printing/tests/test_pycode.py [...]
```

```
9  from sympy.logic import And, Or
10 - from sympy.matrices import SparseMatrix, MatrixSymbol
11 + from sympy.matrices import SparseMatrix, MatrixSymbol, Identity
12  from sympy.printing.pycode import (
...
46  def test_NumPyPrinter():
47      p = NumPyPrinter()
48      assert p.doprint(sign(x)) == 'numpy.sign(x)'
49      A = MatrixSymbol("A", 2, 2)
50      assert p.doprint(A**(-1)) == "numpy.linalg.inv(A)"
51      assert p.doprint(A**5) == "numpy.linalg.matrix_power(A, 5)"
52 +  assert p.doprint(Identity(3)) == "numpy.eye(3)"
```

Gold Patch

```
sympy/printing/pycode.py
```

```
609      return "%s(%s)" % (func, self._print(expr.tolist()))
610
611 +  def _print_Identity(self, expr):
612 +      shape = expr.shape
613 +      if all([dim.is_Integer for dim in shape]):
614 +          return "%s(%s)" % (self._module_format('numpy.eye'),
615 +                               self._print(expr.shape[0]))
616 +      else:
617 +          raise NotImplementedError("Symbolic matrix dimensions are not yet supported for identity matrices")
618
618  def _print_BlockMatrix(self, expr):
```