Problem 4: Matrix elements

This script evaluates the integrals from problem 4 on Assignment 4. Written by Eric Lindgren (cid: ericlin).

... Syntax: " // First" is incomplete; more input is needed.

Integral 1

Angular part

```
In[ ]:= Integrate[Sin[theta] * Cos[theta]^2, {theta, 0, Pi}]
```

Out[ ]= $\frac{2}{3}$

Radial part

```
In[ ]:= Integrate[r^4 (2 - r / a) E^(-r / a), {r, 0, Infinity}]
```

Out[ ]= ConditionalExpression$\left[-72\, a^5, \text{Re}[a] > 0\right]$

In[ ]:=

Integral 2

Angular part

```
In[ ]:= Integrate[Sin[theta] * Cos[theta]^2, {theta, 0, Pi}]
```

Out[ ]= $\frac{2}{3}$

Radial part

```
In[ ]:= Integrate[r^4 E^(-3 r / (2 a)), {r, 0, Infinity}]
```

Out[ ]= ConditionalExpression$\left[\frac{256\, a^5}{81}, \text{Re}[a] > 0\right]$