

Problem 1

In[1]:= $y[x_] := 2x;$

$$\int_0^2 (xy[x] + 2y[x]y'[x]) dx$$

Out[2]= $\frac{64}{3}$

Problem 2

In[3]:= $x[t_] := t; y[t_] := t^2;$

$$\int_0^1 ((x[t]^2 + 2y[t])x'[t] + (y[t]^2 + x[t])y'[t]) dt$$

Out[4]= 2

Problem 3

In[5]:= $\int_0^3 \int_1^2 (x^2y + xy^2) dx dy$

Out[5]= 24

In[6]:= $\int_1^2 \int_0^3 (x^2y + xy^2) dy dx$

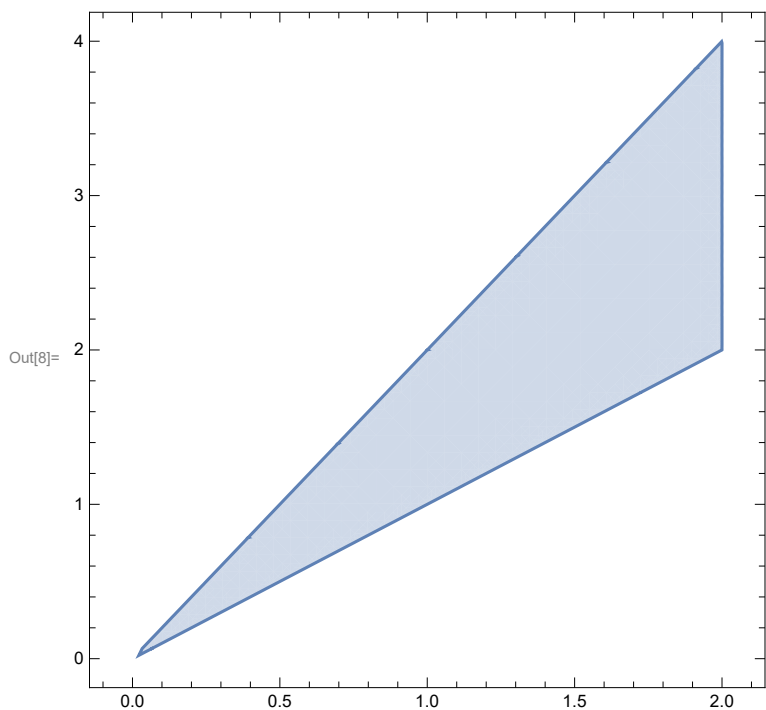
Out[6]= 24

Problem 4a

In[7]:= $\int_0^2 \int_x^{2x} (x^2 + y^2) dy dx$

Out[7]= $\frac{40}{3}$

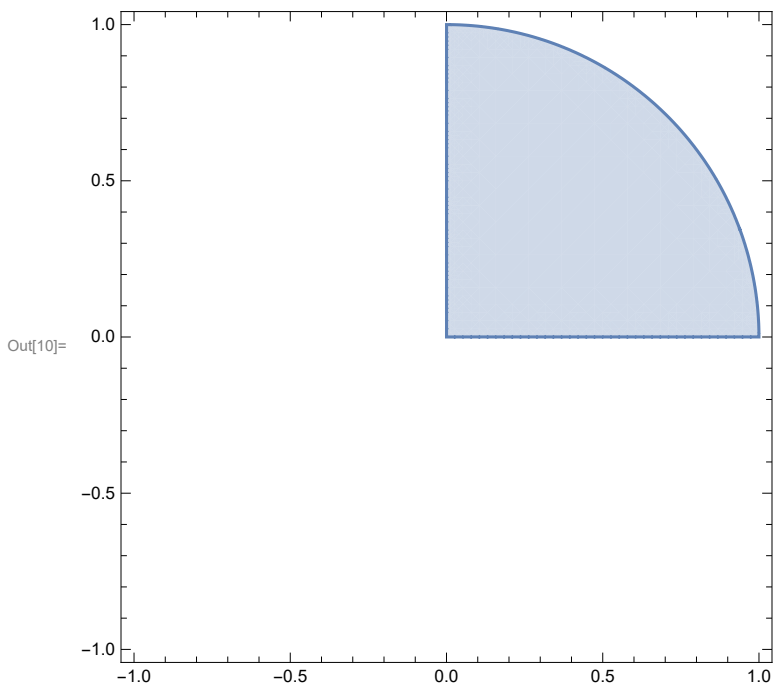
```
In[8]:= RegionPlot[x > 0 && x < 2 && y > x && y < 2 x, {x, -0.1, 2.1}, {y, -0.1, 4.1}, MaxRecursion -> 5]
```



```
In[9]:= Integrate[Integrate[x y^2, {y, 0, Sqrt[1-x^2]}], {x, 0, 1}]
```

```
Out[9]= 1/15
```

```
In[10]:= RegionPlot[x > 0 && x < 1 && y > 0 && y < Sqrt[1-x^2], {x, -1, 1}, {y, -1, 1}, MaxRecursion -> 5]
```

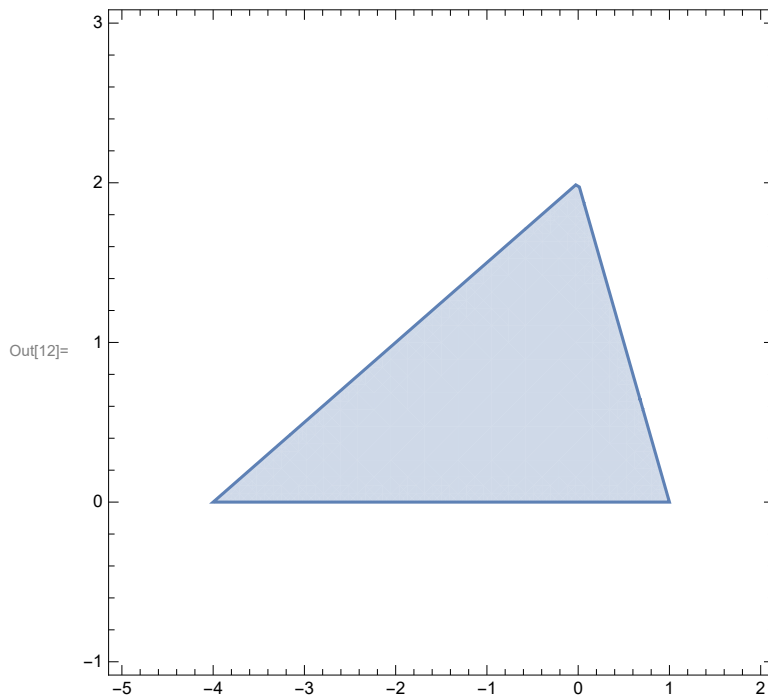


Problem 5

$$\text{In[11]:= } \int_0^2 \int_{2y-4}^{(2-y)/2} (x^3) \, dx \, dy$$

$$\text{Out[11]= } -\frac{51}{2}$$

In[12]:= RegionPlot[x > 2 y - 4 && x < (2 - y) / 2 && y > 0 && y < 2, {x, -5, 2}, {y, -1, 3}, MaxRecursion -> 5]



Problem 6

$$\text{In[13]:= } \int_0^1 \int_0^1 \int_0^1 (x^2 + y^2 + z^2) \, dx \, dy \, dz$$

$$\text{Out[13]= } 1$$

$$\text{In[14]:= } \int_0^c \int_0^b \int_0^a (x y^2 z^3) \, dx \, dy \, dz$$

$$\text{Out[14]= } \frac{1}{24} a^2 b^3 c^4$$

$$\text{In[15]:= } \int_0^2 \int_0^1 \int_{1-y}^1 (x^2) \, dx \, dy \, dz$$

$$\text{Out[15]= } \frac{1}{2}$$

$$\text{In[16]:= } \int_0^\infty \int_0^\infty \int_0^\infty \text{Exp}[-x - y - z] \, dx \, dy \, dz$$

$$\text{Out[16]= } 1$$