

Brian — PS 20 — 2025-04-22 — Solution

EIWL3 Sections 45 and 46

Exercises from *EIWL3* Section 45

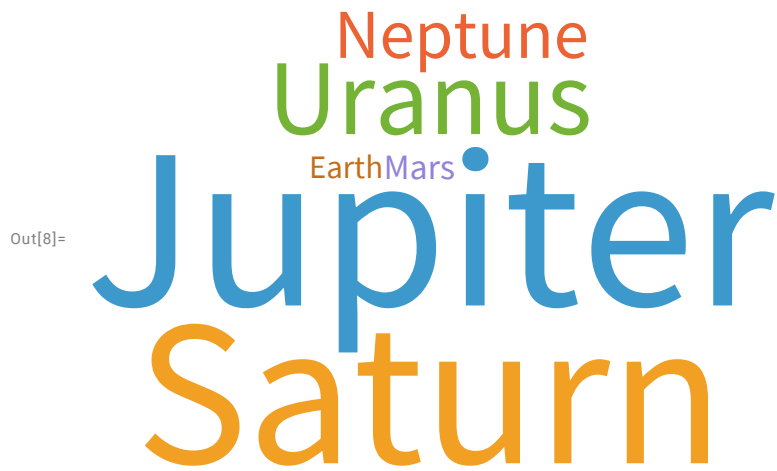
In[6]:= (* For a bunch of the exercises, we need to have defined: *)

```
planets = CloudGet["http://wolfr.am/7FxLgPm5"]
```

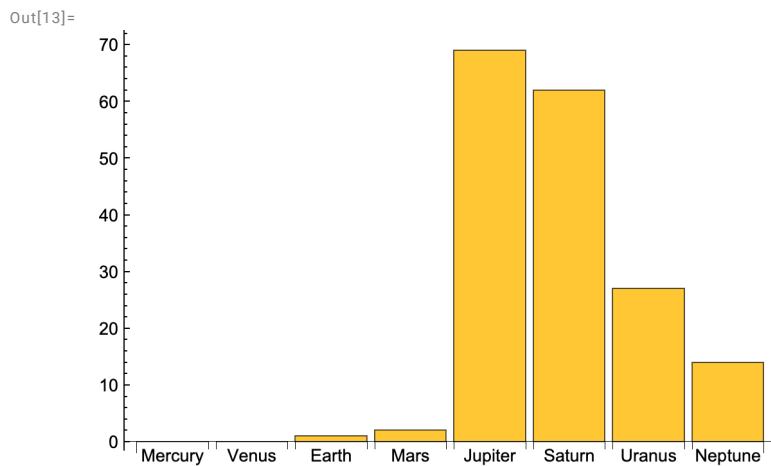
Out[6]=

	Mass	Radius	Moons		
				Mass	Radius
Mercury	3.30104×10^{23} kg	1516.0 mi			
Venus	4.86732×10^{24} kg	3760.4 mi			
Earth	5.9721986×10^{24} kg	3958.761 mi	Moon	7.3459×10^{22} kg	1079.6 mi
Mars	6.41693×10^{23} kg	2106.1 mi	Deimos	1.5×10^{15} kg	3.9 mi
			Phobos	1.072×10^{16} kg	6.90 mi
Jupiter	1.89813×10^{27} kg	43 441. mi	Adrastea	$7. \times 10^{15}$ kg	5.1 mi
			Aitne	$4. \times 10^{13}$ kg	0.93 mi
			69 total ›		
Saturn	5.68319×10^{26} kg	36 184. mi	Aegaeon	—	0.16 mi
			Aegir	—	1.9 mi
			62 total ›		
Uranus	8.68103×10^{25} kg	15 759. mi	Ariel	1.35×10^{21} kg	359.7 mi
			Belinda	3.57×10^{17} kg	25.0 mi
			27 total ›		
Neptune	1.02410×10^{26} kg	15 299. mi	Despina	2.1×10^{18} kg	47. mi
			Galatea	3.7×10^{18} kg	55. mi
			14 total ›		

```
In[8]:= (* 45.1 *) WordCloud[planets[All, "Moons", Length]]
```



```
In[13]:= (* 45.2 *) BarChart[planets[All, "Moons", Length], ChartLabels → Automatic]
```



```
(* 45.3 *) planetsSortedByNumberOfMoonsDescending =  
Reverse[planets[SortBy[Length[#Moons] &]]];  
planetsSortedByNumberOfMoonsDescending[All, "Mass"]
```

Out[30]=

Jupiter	1.89813×10^{27} kg
Saturn	5.68319×10^{26} kg
Uranus	8.68103×10^{25} kg
Neptune	1.02410×10^{26} kg
Mars	6.41693×10^{23} kg
Earth	5.9721986×10^{24} kg
Venus	4.86732×10^{24} kg
Mercury	3.30104×10^{23} kg

```
In[64]:= (* 45.4 *) allMoons = planets[All, "Moons"]
(* the preceding table was not asked for (just practicing) *)
(* the following table is what was asked for *)
planets[All, "Moons", Max, "Mass"]
```

Out[64]=

		Mass	Radius
Mercury			
Venus			
Earth	Moon	7.3459×10^{22} kg	1079.6 mi
Mars	Deimos	1.5×10^{15} kg	3.9 mi
	Phobos	1.072×10^{16} kg	6.90 mi
Jupiter	Adrastea	$7. \times 10^{15}$ kg	5.1 mi
	Aitne	$4. \times 10^{13}$ kg	0.93 mi
69 total >			
Saturn	Aegaeon	—	0.16 mi
	Aegir	—	1.9 mi
62 total >			
Uranus	Ariel	1.35×10^{21} kg	359.7 mi
	Belinda	3.57×10^{17} kg	25.0 mi
27 total >			
Neptune	Despina	2.1×10^{18} kg	47. mi
	Galatea	3.7×10^{18} kg	55. mi
14 total >			

Out[65]=

Mercury	— ∞
Venus	— ∞
Earth	7.3459×10^{22} kg
Mars	1.072×10^{16} kg
Jupiter	1.4815×10^{23} kg
Saturn	1.3452×10^{23} kg
Uranus	3.526×10^{21} kg
Neptune	2.1394×10^{22} kg

```
In[55]:= planets[All, "Moons", "Mass"]
```

```
Out[55]=
```

Mercury	—
Venus	—
Earth	—
Mars	—
Jupiter	—
Saturn	—
Uranus	—
Neptune	—

```
In[58]:= (* 45.5 *) Sort[planets[All, "Moons", Max, "Mass"]]
```

```
Out[58]=
```

Mercury	$-\infty$
Venus	$-\infty$
Mars	$1.072 \times 10^{16} \text{ kg}$
Uranus	$3.526 \times 10^{21} \text{ kg}$
Neptune	$2.1394 \times 10^{22} \text{ kg}$
Earth	$7.3459 \times 10^{22} \text{ kg}$
Saturn	$1.3452 \times 10^{23} \text{ kg}$
Jupiter	$1.4815 \times 10^{23} \text{ kg}$

```
In[59]:= (* 45.6 *) planets[All, "Moons", Median, "Mass"]
```

```
Out[59]=
```

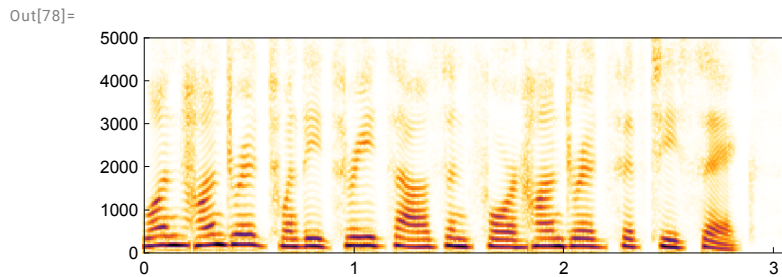
Mercury	—
Venus	—
Earth	$7.3459 \times 10^{22} \text{ kg}$
Mars	$6.10 \times 10^{15} \text{ kg}$
Jupiter	$1.9 \times 10^{14} \text{ kg}$
Saturn	$8.2 \times 10^{15} \text{ kg}$
Uranus	$3.57 \times 10^{17} \text{ kg}$
Neptune	$3.7 \times 10^{18} \text{ kg}$

```
(* 45.7 *) earthMass = Earth PLANET [mass];
```

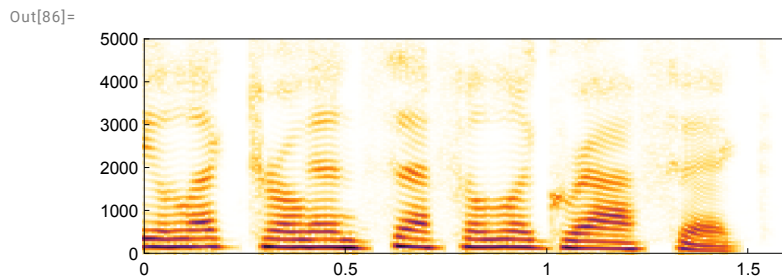
```
In[72]:= planet[All, "Moons", Select[# > 0.0001 earthMass &]]
```

Exercises from *EIWL3* Section 46

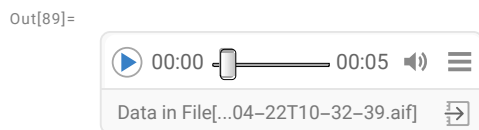
In[78]:= (* 46.1 *) Spectrogram[SpeechSynthesize[IntegerName[123 456]]]



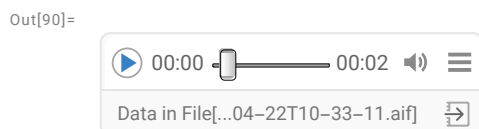
In[86]:= (* 46.2 *) Spectrogram[SpeechSynthesize[SortBy[WordList[], StringLength[#] &][[-1]]]



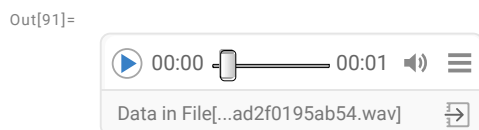
In[89]:= (* 46.3 *) spokenAlphabet = SpeechSynthesize[StringRiffle[Alphabet[], " "]]



In[90]:= (* 46.4 *) SpeechSynthesize[spokenAlphabet]



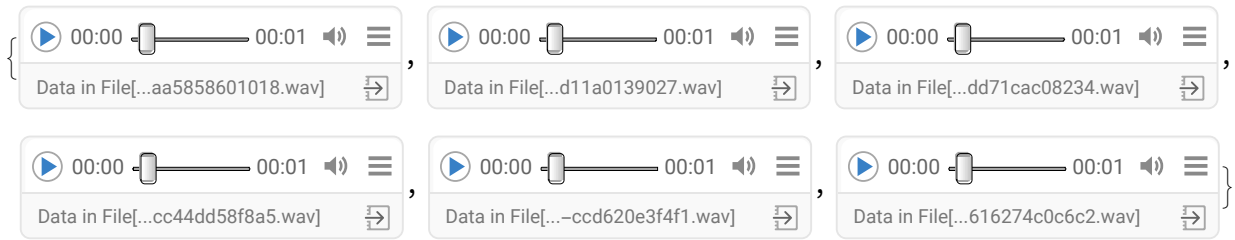
In[91]:= (* 46.5 *) AudioPitchShift[SpeechSynthesize["hello"], 2]



In[92]:= (* 46.6 *)

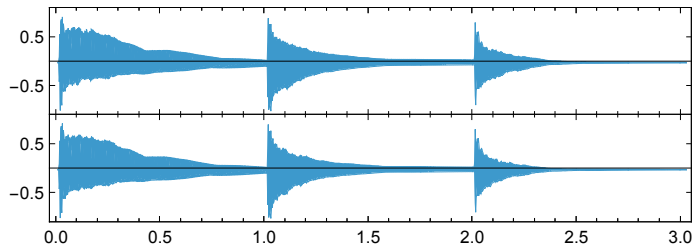
Table[AudioPitchShift[SpeechSynthesize["computer"], r], {r, 1.0, 1.5, 0.1}]

Out[92]=



In[99]:= (* 46.7 *) AudioPlot[Sound[Table[SoundNote[note, 1, "Guitar"], {note, {0, 12, 24}}]]]

Out[99]=



In[100]:=

(* 46.8 *) Table[

AudioIdentify[AudioPitchShift[SoundNote[0, 1, "Trumpet"], r], {r, 0.5, 1.0, 0.1}]

Out[100]=

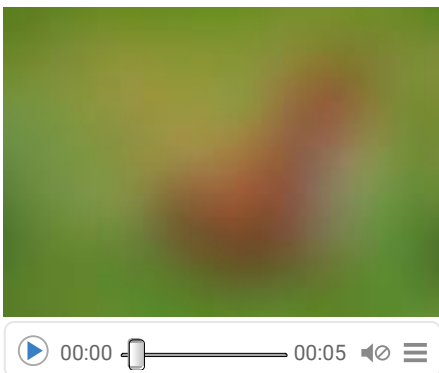
{trombone, trombone, trombone, trumpet, trumpet, trumpet}

In[105]:=

(* 46.9 *) foxImage = red fox SPECIES SPECIFICATION [image];

AnimationVideo[Blur[foxImage, 20 - step], {step, 0, 20}]

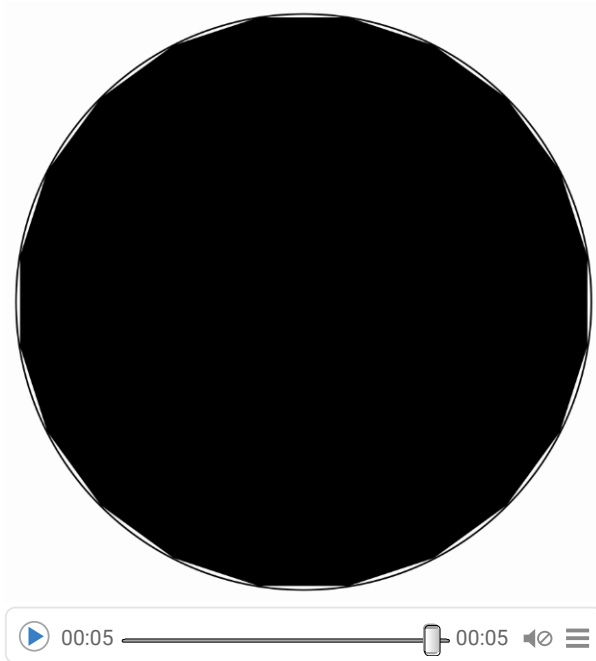
Out[106]=



In[110]:=

(* 46.10 *)**AnimationVideo[Graphics[{Circle[], RegularPolygon[vertices]}], {vertices, 3, 20}]**

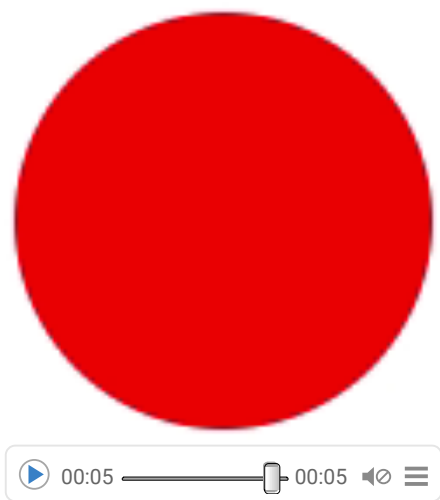
Out[110]=



In[112]:=

(* 46.11 *) AnimationVideo[Graphics[{Hue[hue], Disk[]}, ImageSize -> 50], {hue, 0, 1}]

Out[112]=



In[126]:=

```
(* 46.12 *) AnimationVideo[Graphics[Rasterize[letter, RasterSize → 200]],  
  {letter, Capitalize[Alphabet[]]}, FrameRate → 2]
```

Out[126]=

