

```
> #Solutions for Lab 3, Thursday section
```

```
> #Q1: Write a function f1 to convert km to miles (1.61 km = 1 mile).
```

```
> km2mile:=x->x/1.61;
```

$$km2mile := x \rightarrow \frac{x}{1.61}$$

```
> km2mile(3.22);
```

```
2.000000000
```

```
> #Q2: Write a function f2 that takes as input two integers m,n and outputs the last digit of m+n. Hint: check out the function irem. Call the function on the pairs (73,10),(11,199).
```

```
> lastdig:=(m,n)->irem(m+n,10);
```

$$lastdig := (m, n) \rightarrow irem(m + n, 10)$$

```
> lastdig(73,10); lastdig(11,199);
```

```
3
```

```
0
```

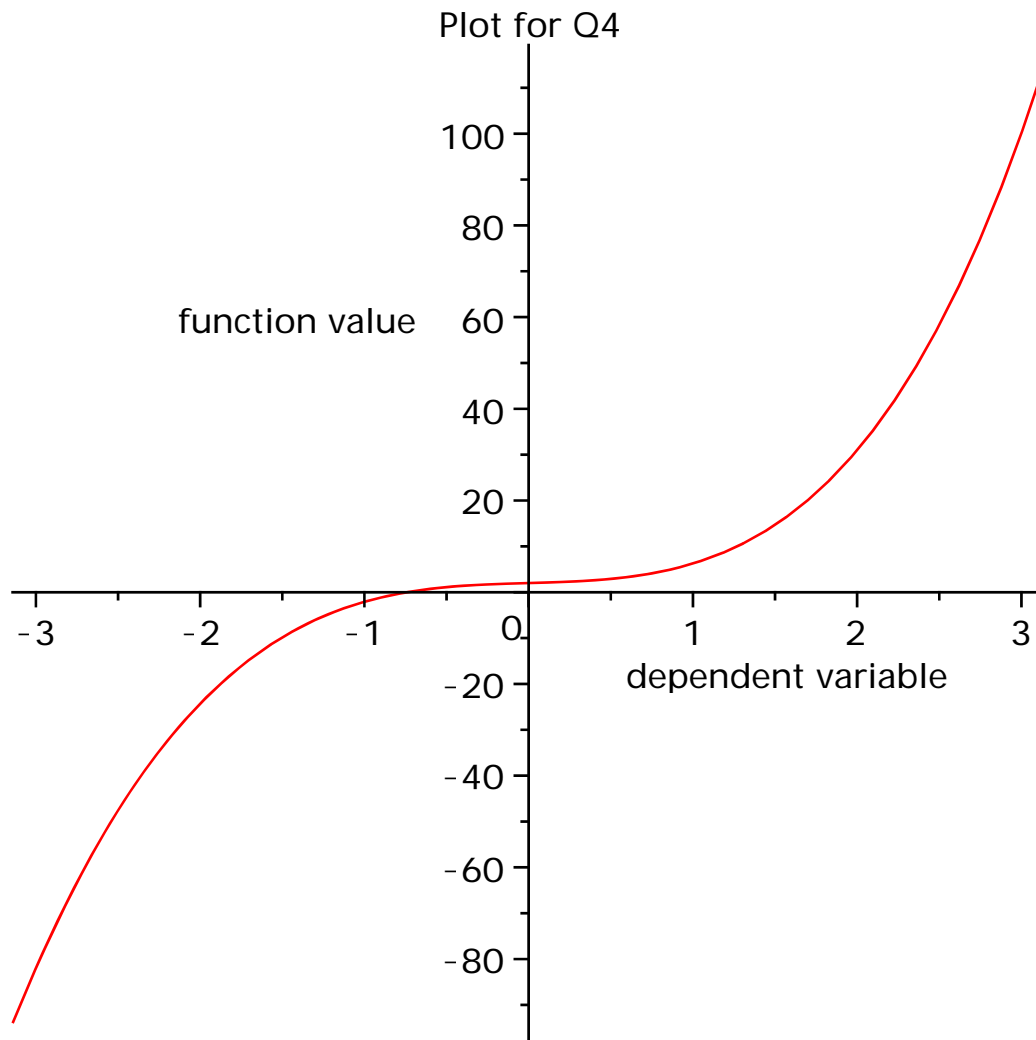
```
> #Q3: Write a function that takes a single real number x as input and outputs the value of  $3x^3 + \exp(x) + \cos(x)$ .
```

```
> q3func:= x->3*x^3+exp(x)+cos(x);
```

$$q3func := x \rightarrow 3x^3 + e^x + \cos(x)$$

```
> #Q4: Plot the above function over  $-\pi \leq x \leq \pi$  and label the axes. Give a title to the plot (the title does not have to be very informative).
```

```
> plot(q3func(x),x=-Pi..Pi,labels=["dependent variable","function value"],title="Plot for Q4");
```



> #Q5: Write a function that takes a single input (an integer  $n$ ) returns the integer 1 if  $n$  is prime and 0 otherwise. You will only test this function with integers and so no input type specification/checking is needed. Call the function with inputs 23, 871, 873 and 9876543.

```
> q5func:=n->piecewise(isprime(n),0,not isprime(n),23);
      q5func := n → piecewise(isprime(n), 0, not isprime(n), 23)
```

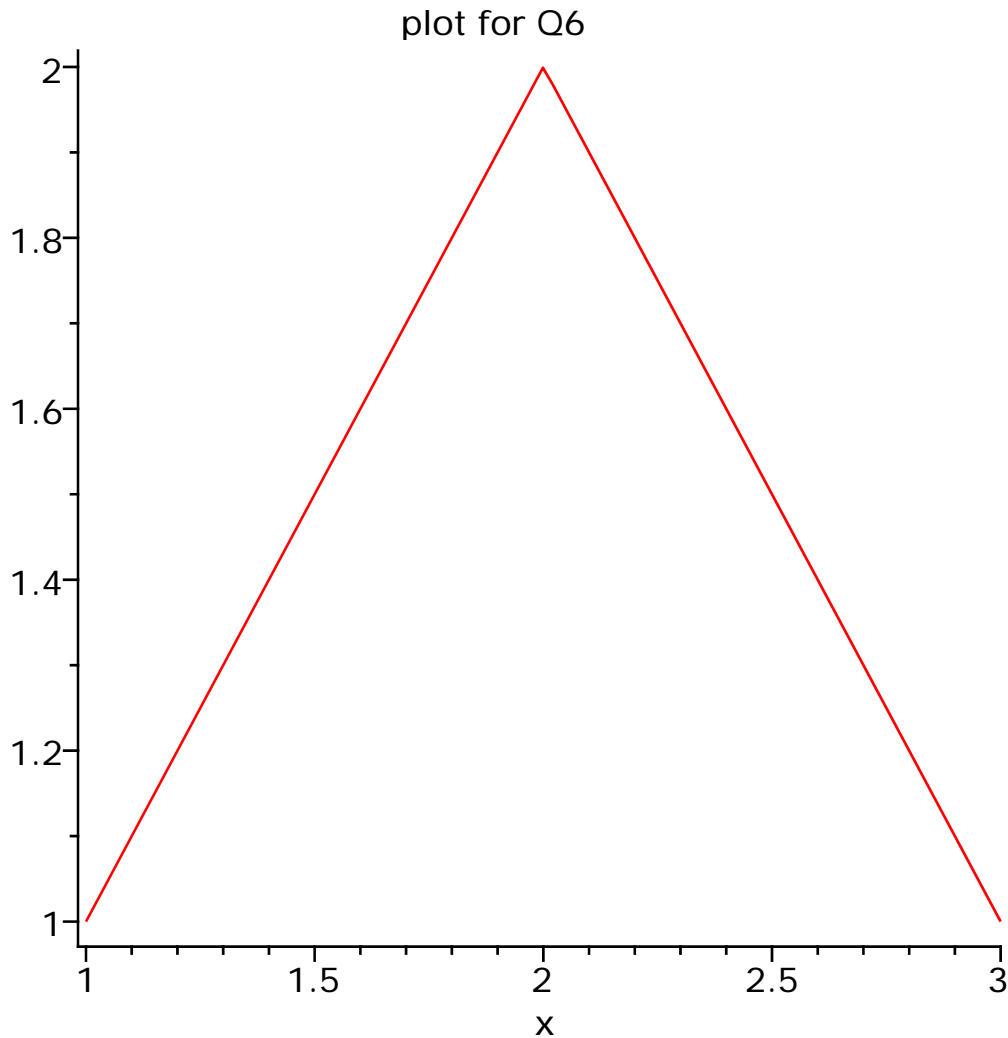
```
> q5func(23);q5func(871); q5func(873); q5func(9876543);
      0
      23
      23
      23
```

> #Q6: In a single plot, draw 2 line segments, one from (1,1) to (2,2) and the other from (2,2) to (3,1). Label only the x axis (as "x") and give a title to the plot.

```
> q6func:=piecewise(1<=x and x<=2,x,2<x and x<=3,4-x);
```

$$q6func := \begin{cases} x & 1-x \leq 0 \text{ and } x-2 \leq 0 \\ 4-x & -x < -2 \text{ and } x-3 \leq 0 \end{cases}$$

```
> plot(q6func(x),x=1..3,labels=["x",""],title="plot for Q6");
```



```
> #Q7: In the saIn a single plot, draw a semicircle with centre (1,0), radius 1 and containing all non-positive y values. Also close the semicircle by drawing the diameter that lies on the x axis. Use an appropriate color so that the line can be seen on the screen. Hint: If you have forgotten the equation of a circle, type ?Circle.
```

```
> plot({-sqrt(1-(1-x)^2),0},x=0..2,thickness=3);
```

