1. Consider the following functions:

$$f(x) = x^2 + 3x - 7 \quad \text{and} \quad g(x) = x^3 - 8x^2 + 24x - 24.$$

    a. Evaluate these functions at $x = -2$ and $x = 3$.

    b. Use Maple's **solve** and **fsolve** commands to find the solutions of $f(x) = 0$ and $g(x) = 0$.

    c. Use Maple's **factor** command to factor $g(x)$.

2. Consider the functions:

$$f(x) = 4 - x \quad \text{and} \quad g(x) = \frac{2x}{6 - x - x^2}.$$

    a. Use Maple to plot these functions. To plot multiple functions and ones that are discontinuous along with restricting the range, you use the following Maple command:

```
> plot({f(x),g(x)},x=-10..10,y=-10..10,discont=true,color=blue);
```

    b. Find all points of intersection between these curves. Give both the x and y values for the points of intersection. The **fsolve** command can be used to find a particular point of intersection by restricting the range of the search.

```
> xs := fsolve(f(x)=g(x),x=2..10); f(xs);
```

    c. Find all vertical and horizontal asymptotes for the function $g(x)$. Recall that vertical asymptotes are when the denominator is zero. You can get the denominator of $g(x)$ with Maple command

```
> denom(g(x));
```

The horizontal asymptote is found for either large or small values of x, which can be found with the **limit** command in Maple

```
> limit(g(x), x = infinity); limit(g(x), x = -infinity);
```

3. Consider the functions:

$$f(x) = x^2 \quad \text{and} \quad g(x) = e^{-x}\cos(x).$$

Graph these functions on the interval $x \in [-5, 5]$. Also, find 4 points of intersection to at least 5 significant figures (both x and y values). Note that there are infinitely many points of intersection. Can you explain why?

4. Use Maple's **diff** and **int** commands to differentiate and integrate the following functions:

$$f(x) = e^{-x}\cos(3x) \quad \text{and} \quad g(x) = e^{-x^2}.$$

Along with the indefinite integral, integrate both functions from 0 to ∞. The definite integral from 0 to ∞ in Maple is done with the command

```
> int(f(x),x=0..infinity);
```

5. Consider the function
$$f(x) = (9 - x^2)e^{-x^2}.$$

a. Graph this function on the intervals $x \in [-5, 5]$ and $x \in [2.9, 4]$.

b. Find all x and y-intercepts. Compute the first and second derivatives of this function. Use Maple's **simplify** and **factor** commands to improve the form of your answers.

c. Find all extrema (3 of them) and points of inflection (4 of them). Give the x and y values for these points.

d. Is this function even, odd, or neither? Find any horizontal asymptotes.

6. Consider the functions
$$f(x) = x^4 - 4x^2 - 5 \qquad \text{and} \qquad g(x) = 6 - 7e^{-0.5x^2}.$$

a. Graph this function on the intervals $x \in [-3, 3]$. Find the two points of intersection.

b. Find all extrema for both of these functions. Give the x and y values for these points. Find any horizontal asymptotes.

c. Find the area between these two functions.

7. Use Maple's **Help** to find information on **pdesolve** (partial differential equation solver). By copying and pasting the relevant example, then making appropriate modifications, solve the wave equation given by
$$\frac{\partial^2 U}{\partial x^2} - 4\frac{\partial^2 U}{\partial y^2} = x.$$