Show all work. Answers given with incomplete reasoning will not receive full credit.

Question 1 (4 points) Let

\[ f(x) = x^3 - 5x \]

For the function \( f(x) \), determine its:

(a): Domain; (b): Intercepts; (c): Symmetry; (d): Asymptotes; (e): Intervals of increase and decrease; (f): Local maximum and minimum values; (g): Concavity and points of inflection.

Then, using your answers to (a) through (g) above, sketch a graph of \( f(x) \).
Question 2 (2 points) Find the point on the curve 

\[ f(x) = 2\sqrt{x} \]

That is closest to the point \((4, 0)\).

We want to minimize:

\[ d(x) = (x - 4)^2 + (2\sqrt{x} - 0)^2 \]

\[ = (x^2 - 8x + 16) + 4x \]

\[ = x^2 - 4x + 16 \quad \text{①} \]

Now, \( d'(x) = 2x - 4 \), and \( d'(x) = 0 \) gives

\[ 2x - 4 = 0 \Rightarrow x = 2 \quad \text{⑤} \]

This is a min since \( \frac{d^2}{dx^2} > 0 \) \( d'(x) \)

So, the point is \((2, f(2))\)

\[ = (2, 2\sqrt{2}) \quad \text{③} \]