1. Use the guidelines of this section to sketch the curve.

$y = x^3 + x$

Domain: $(-\infty, \infty)$

Intercepts:
$f(0) = (0)^3 + 0 = 0$

$0 = x^3 + x$
$0 = x(x^2 + 1)$
$x = 0$

Symmetry:
Even?
Does $f(x) = f(-x)$?

(Using 2 as test value.)
$f(-2) = (-2)^3 + (-2) = -29$
$f(2) = (2)^3 + 2 = 10$

So, $f(x) \neq f(-x)$.

Odd?
Does $-f(x) = f(-x)$?

Using 2 as test value.
$-f(x) = -(2^3 + 2) = -10$
$f(-2) = (-2)^3 - 2 = -10$

So, $-f(x) = f(-x)$.

So, the function is odd.

Asymptotes:
There will be no vertical asymptotes because there is no place where the function is undefined.

There will be no horizontal asymptotes because we can see that a positive value of x will cause the function to go to positive infinity and we know that there is symmetry with respect to the origin.

Decreasing/Increasing Intervals:
$f(x) = x^3 + x$
$f'(x) = 3x^2 + 1$
This is always positive. So, $f(x)$ is always increasing.

Local Min./Max.:
Because $f(x)$ is always increasing on its domain, there is no local max. or min.

Concavity and Inflection Points:
$f''(x) = 6x$

$x < -\infty$: $f''(x)$ will be negative. So, for this interval, f(x) will be CD.

$x > \infty$: $f''(x)$ will be positive. So, for this interval, $f(x)$ will be CU.

Concavity and Inflection Points:
We know the x and y intercepts and the intervals of

concavity. If we graph a couple of points using the original equation, we can see the graph.