Problem: Nonlinear Dynamics

Nonlinear Dynamics

0.0/20.0 points (graded)

Consider a system with the dynamics given by

$$\dot{x} = x^3 + 2x^2 - 5x - 6$$

Fill in the MATLAB code below, which is supposed to:

- Plot a phase diagram $\dot{x}$ vs. x for this system and set the three equilibrium points. Ensure that all equilibrium points are included in the plot range.
- Set the variable "eq_points" such that $x = eq\_points\,(i)$ is an equilibrium point.

Do not change the variable names x, xdot, and eq_points.

```
x =
xdot =
eq_points =
plot(x,xdot)

```

Unanswered

```
x = linspace(-10,10,1000);
xdot = x.^3 + 2*x.^2 - 5*x - 6;
eq_points = [-3;-1;2];
plot(x,xdot);
```

Run Code

Is the first equilibrium point (at the smallest value of x) stable, unstable, or marginally stable?

- Stable
- Unstable ✔
- Marginally stable

Is the second equilibrium point stable, unstable, or marginally stable?

- Stable ✔
- Unstable
- Marginally stable

Is the third equilibrium point (at the largest value of /(x/)) stable, unstable, or marginally stable?

- Stable
- Unstable ✔

Marginally stable

There is an interval, containing the origin, that is a region of attraction for one of these points. Identify this interval, using standard notation of (a, b) for open intervals and $[a, b]$ for closed intervals. Indicate a interval extending to infinity with "-inf" or "inf."

Answer: \s * −\s * 3\s*, \s * 2\s*

The region of attraction is (-3,2)

Submit You have used 0 of 3 attempts

Answers are displayed within the problem