ME 1020 Engineering Programming with MATLAB

Problem 5.5:

5.* Cables are used to suspend bridge decks and other structures. If a heavy uniform cable hangs suspended from its two endpoints, it takes the shape of a *catenary* curve whose equation is

$$y = a \cosh\left(\frac{x}{a}\right)$$

where a is the height of the lowest point on the chain above some horizontal reference line, x is the horizontal coordinate measured to the right from the lowest point, and y is the vertical coordinate measured up from the reference line.

Let $a = 10$ m. Plot the catenary curve for $-20 \le x \le 30$ m. How high is each endpoint?

```
function y = funprob5_5(x)
a = 10;% m
y = a*cosh(x/a);
end
```

```
% Problem 5.5
clear
clc
disp('Problem 5.5: Scott Thomas')

xmin = -20;
xmax = 30;

fnc = @funprob5_5;
fplot(fnc,[xmin xmax]),xlabel('x (m)'), ylabel('y (m)'),grid on

ymin = funprob5_5(xmin)
ymax = funprob5_5(xmax)
```

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ymin =

   37.6220

ymax =

  100.6766