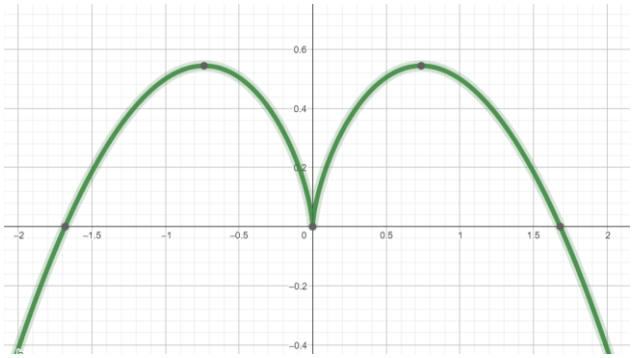
7/28/25 Name _____ APID _____

US25 MTH 124 Activity 4 (4.1/4.2/4.3/4.4/4.5/5.1/5.3) (ALL WORK REQUIRED)

Note: (1) If you think the answer doesn't exist, just demonstrate your work and write "DNE" or "doesn't exist".

(2) Each question is worth 5 points. And the final score will be rescaled to the total 20 points and then rounded to 2 decimal place.

1) (20points) The graph of the funciton $f(x)=x^{\frac{2}{3}}-\frac{x^2}{2}$ is given below. Follow the following steps to find out the extrema of the function over the interval [-1, 2) .



[i] What are the singular points of $f(x)$?

[ii] What are the stationary points of $f(x)$?

[iii] What are the endpoints of $f(x)$ over this interval [-1, 2)?

[iv] Find all extrema of the function f and determine they are relatively/absolutely minimum/maximum.

2) (10points) Compute $f'(x)$ for the following function.

[i] $f(x)=\dfrac{x^2-2}{x+1}$

[ii] $f(x)=e^{-|x|}$

3) (5points) Find the values of the constants a.

[i] $f(x)=\dfrac{2x+a}{x+1}$ with $f'(1)=1$

4) (5points) A formation of mold is growing in a circular rate in a petri dish. The radius is measured to be growing at a rate of 0.4 cm/day. How fast is the area of the mold growing when the culture has reached a radius of 5cm?

5) (10points) **Rounded the answers in this problem to 1 decimal places.**

On a road, the position of a car is described by the following equation:

$$P(t) = 6(t-1)^3 + 6t + 6, \quad 0 \le t \le 3$$

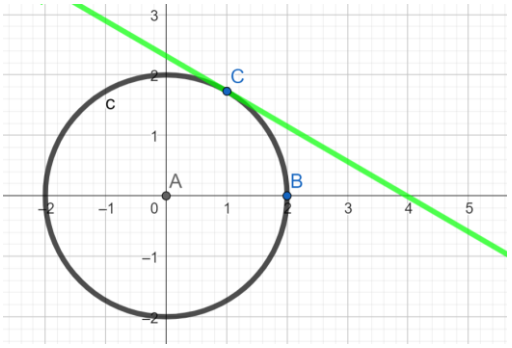
Where the unit of t is hour and the unit of P is mile.

[i] Does this car go over the speed limit? Assume the speed limit is 60 mile/hr.

[ii] When does this car have no acceleration?

6) (15points) Given a circle centered at the origin with radius 2. There is a point $C\left(1, \sqrt{3}\right)$ on the circle. Follow the following steps to find the equation of the tangent of C to the circle

[i] Formulate the y coordinate of the upper circle as a funciton of the x coordinate.



[ii]What's the slope of the tangent line at C?

[iii] What's the equation of the tangent line at C?