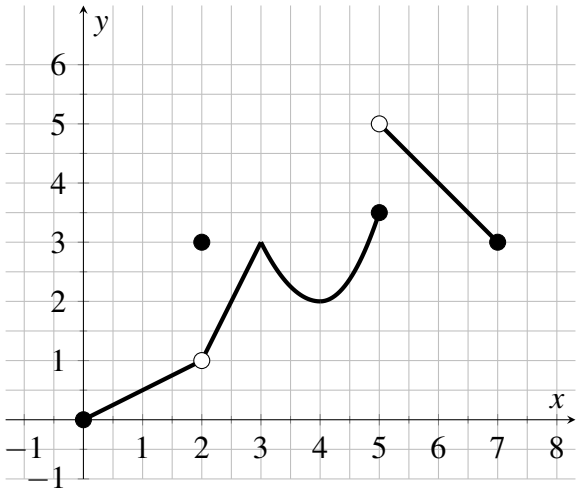
Name: _____ _____ **/ 25**

Circle one: **Rhodes (F01)** | **Bueler (F02)**

25 points possible. No aids (book, calculator, etc.) are permitted. You need not simplify, but show all work and use proper notation for full credit.

1. [4 points] Use the graph to state all the absolute and local maximum and minimum values of the function.



abs. min @ x=0

no abs. max.

loc. min @ x=4

loc. max @ x=2,3

2. [7 points] Find the absolute maximum and absolute minimum values of f on the given interval.

$$f(x) = 2x^3 - 24x - 1, \quad [0,3]$$

$f'(x) = 6x^2 - 24 = 0$

$x^2 = 4$

$x = \pm 2$

$x = -2$ is not in $[0,3]$

x	$f(x)$
0	−1
+2	−33
3	−19

abs. min @ $x=2$

abs. max @ $x=0$

3. [6 points] Find the critical numbers (critical points) of the function.

$g(t) = t^2 e^{-5t}$

$g'(t) = 2te^{-5t} + t^2 e^{-5t}(-5)$

$= e^{-5t}(2t - 5t^2) = e^{-5t}\, t(2-5t)$

$t = 0$ or $2 - 5t = 0$

$t = \frac{2}{5}$

4. [8 points] Suppose f is continuous on $[0,4]$ and has a derivative at each point in $(0,4)$. Suppose $f(0) = -1$ and $f(4) = 5$.

a. What specifically does the Mean Value Theorem let you conclude?

there is c in $[0,4]$ so that

$f'(c) = \frac{5-(-1)}{4-0} = \frac{6}{4} = \frac{3}{2}$

b. Draw a diagram that illustrates the Mean Value Theorem for this problem. Your illustration should include a tangent line somewhere.