Math 75
Burger DQ1

Name Key

You may use a calculator.

5 pts. Show work!

1. Find the absolute extrema for the function $f(x) = \frac{x^4}{4} + \frac{2x^3}{3} - \frac{3x^2}{2}$ on the closed interval $[-1,1]$ by doing two tasks:

a. Determine the critical points: use power rule ✓

$$f'(x) = \frac{\cancel{4}x^3}{\cancel{4}} + \frac{\cancel{3}\cdot 2x^2}{\cancel{3}} - \frac{\cancel{2}\cdot 3x}{\cancel{2}}$$

set $f'(x) = 0$ for crit. pts then factor:

$$f'(x) = 0 = x^3 + 2x^2 - 3x$$

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

Giving crit. pts at $x = 0, 1, -3$

Forget this.

b. Evaluate the function at the endpoints and the critical points in the interval.

$x = -3$ is NOT in $[-1, 1]$ so forget it!

Just need $f(-1)$, $f(1)$ and $f(0)$

$$f(-1) = \frac{(-1)^4}{4} + \frac{2(-1)^3}{3} - \frac{3(-1)^2}{2} = \frac{1}{4} - \frac{2}{3} - \frac{3}{2} = \frac{3}{12} - \frac{8}{12} - \frac{18}{12} = \frac{3-8-18}{12} = \frac{-23}{12} \approx -1.9$$

$(-1, -1.4)$

$$f(1) = \frac{1}{4} + \frac{2}{3} - \frac{3}{2} = \frac{3+8-18}{12} = \frac{-7}{12} \approx -.6$$

$(1, -7/12)$

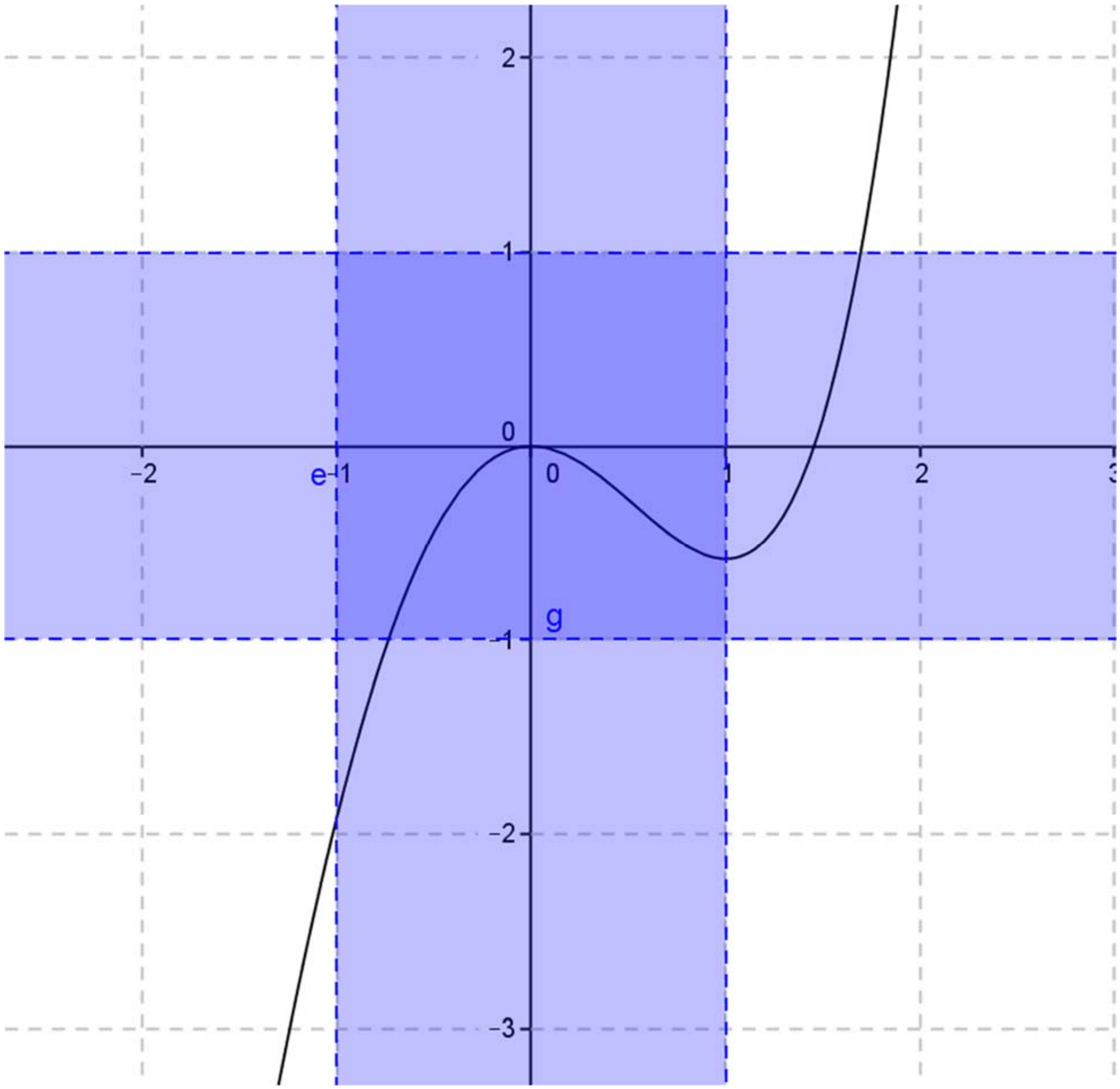
$(0,0)$ $f(0) = 0$ obviously.

so abs. min. $\rightarrow -1.4 < -.6 < 0$ abs. max

c. Put answer(s) in box below as ordered pair(s).

$(-1,-1.9) = (-1, \frac{-23}{12})$ abs. minimum on $[-1,1]$	$(0,0)$ abs. max on $[-1,1]$

see Graph! next page


2
1
0
−2
e
−1
0
1
2
3
g
−1
−2
−3