

## Exam 3

#1  $f'(x) = 3x^2 - 12x = 3x(x-4) = 0$  at  $x = 0, 4$

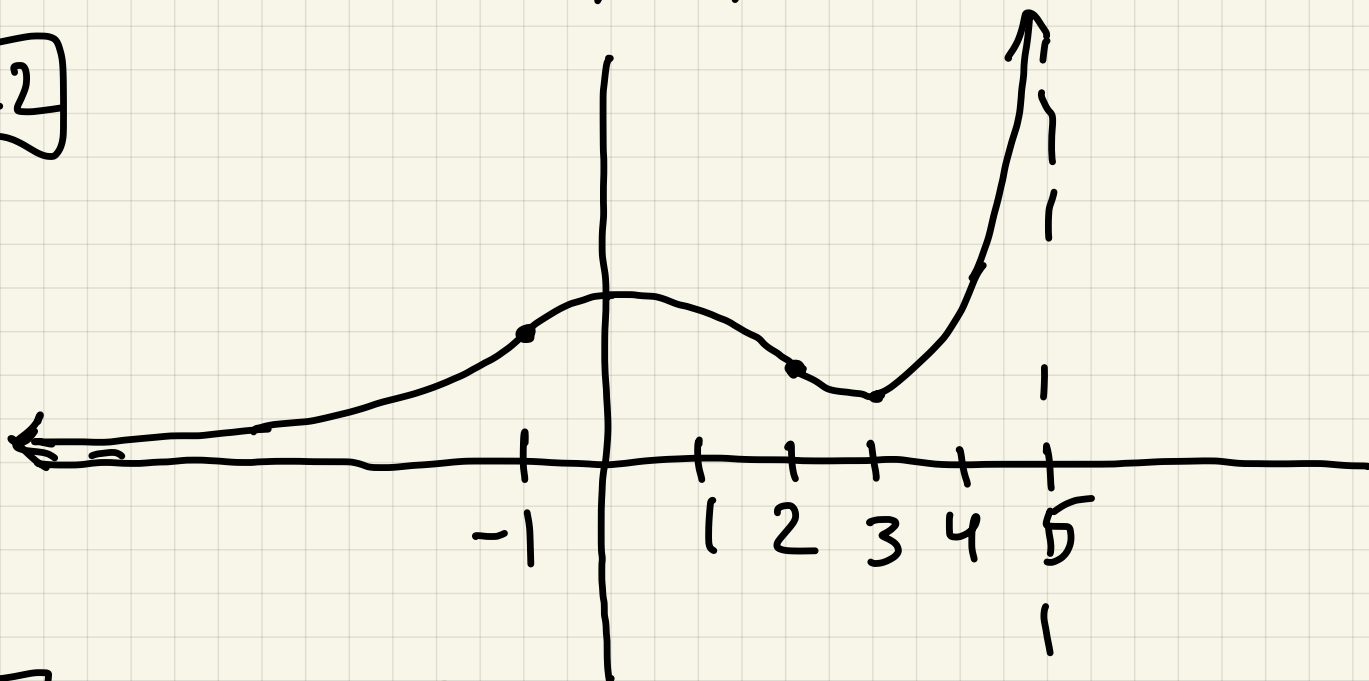
$f(-2) = -32 \leftarrow$  abs min

$f(0) = 0 \leftarrow$  abs max

$f(4) = -32 \leftarrow$  abs min

$f(5) = -25$

#2

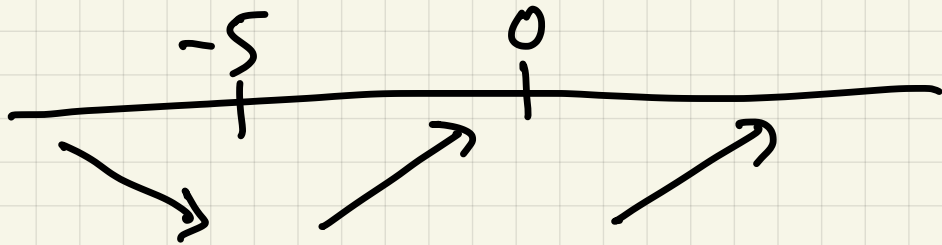


#3 (a)  $\frac{1}{3}x^{12} - \frac{2}{x^6} + C$

(b)  $-6\cos x + \frac{5}{2}\sin(2x) + C$

(c)  $\frac{4}{7}e^{7x} + 8\arctan x + C$

#4 (a)  $f' = 5x^4e^x + x^5e^x =$   
 $(5+x)x^4e^x = 0$  at  $x = 0, -5$



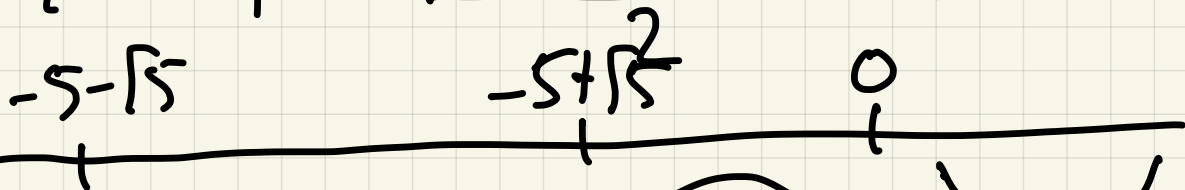
$f$  incr on  $(-5, \infty)$ ,  $f$  decr on  $(-\infty, -5)$

$$(b) f'' = 20x^3 e^x + 5x^4 e^x + 5x^4 e^x + x^5 e^x$$

$$= e^x (x^5 + 10x^4 + 20x^3) =$$

$$e^x x^3 (x^2 + 10x + 20) = 0 \text{ at}$$

$$x = 0, \quad \frac{-10 \pm \sqrt{100 - 80}}{2} = -5 \pm \sqrt{5}$$



$f$  conc down  $(-\infty, -5 - \sqrt{5}) \cup (-5 + \sqrt{5}, 0)$

conc up  $(-5 - \sqrt{5}, -5 + \sqrt{5}) \cup (0, \infty)$

(c) local max NONE!  
 local min  $x = -5$   
 inflect pts  $x = -5 \pm \sqrt{5}, 0$

#5

(a)  $(-4, -2) \cup (0, 4)$

(b)  $(-\infty, -3) \cup (-1, 3)$

(c)  $(-\infty, -2) \cup (0, 1) \cup (2, 4)$



