

## Imp't info

new material up until Thurs.  
 Midterm review Fri - Wed.  
 Midterm Thurs & Fri

## Review

$$\textcircled{1} f(x) = x^2 + 8x + 10$$

$$f'(x) = 2x + 8$$

$$0 = 2x + 8$$

$$-8 = 2x$$

$$x = -4$$

$$f'(x) \begin{array}{c} - \quad + \\ \hline -4 \end{array}$$



$$\text{Critical \# } -4$$

$$\uparrow (-4, \infty)$$

$$\downarrow (-\infty, -4)$$

$$\text{min: } (-4, -6)$$

$$\text{max: none}$$

$$f(-4) = -6$$

②  $f(x) = x^3 - 6x^2 + 15$

$f'(x) = 3x^2 - 12x$   
 $0 = 3x(x - 4)$   
 $x = 0 \quad x = 4$

$f'(x)$   $\begin{array}{c} + & - & + \\ \hline 0 & & 4 \end{array}$

$\begin{array}{c} \curvearrowright \\ \curvearrowleft \end{array}$

Crit # 0, 4  
 $\uparrow (-\infty, 0) \cup (4, \infty)$   
 $\downarrow (0, 4)$   
 min (4, -17)  
 Max (0, 15)

$f(4) = -17$   
 $f(0) = 15$

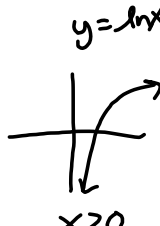
③  $f(x) = \frac{x^3}{3} - \ln x$

$f(x) = \frac{1}{3}x^3 - \ln x$

$f'(x) = x^2 - \frac{1}{x}$

$0 = x^2 - \frac{1}{x}$

$\frac{x^2}{3} = \frac{1}{3x}$   
 $\sqrt[3]{\frac{1}{3}} = \sqrt[3]{\frac{1}{3}}$   
 $x = 1$

$y = \ln x$   
  
 $x > 0$

$f'(x)$   $\begin{array}{c} - & + \\ \hline 0 & 1 \end{array}$

$\curvearrowright$

Crit #: 1  
 $\uparrow (1, \infty)$   
 $\downarrow (0, 1)$   
 min  $\infty$  1  
 (1,  $\frac{1}{3}$ )  
 Min  $\frac{1}{3}$

④  $f(x) = \frac{x^2}{x+1}$

$$f'(x) = \frac{(x+1)(2x) - x^2(1)}{(x+1)^2} = \frac{2x^2 + 2x - x^2}{(x+1)^2}$$

$$= \frac{x^2 + 2x}{(x+1)^2}$$

$0 = \frac{x^2 + 2x}{(x+1)^2}$

$x^2 + 2x = 0$   
 $x(x+2) = 0$   
 $x=0 \quad x=-2$

$(x+1)^2 = 0$   
 $x = -1$

Sign chart for  $f'(x)$ :

	-	+	-	+
$f'(x)$	-	-	+	+
	-2	-1	0	

Intervals:  
 ↑  $(-\infty, -2) \cup (0, \infty)$   
 ↓  $(-2, -1) \cup (-1, 0)$   
 Max @  $x = -2$   $(-2, -4)$   
 Min @  $x = 0$   $(0, 0)$

$f(x) = (x-2)e^x$

$$f'(x) = (x-2)e^x + e^x$$

$$0 = (x-2)e^x + e^x$$

$$0 = e^x(x-2+1)$$

$$= e^x(x-1)$$

$e^x \neq 0$

$x-1=0$   
 $x=1$

Sign chart for  $f'(x)$ :

	-	+
$f'(x)$	-	+
	1	

Intervals:  
 ↓  $(-\infty, 1)$   
 ↑  $(1, \infty)$   
 Min @ 1

$f(1) = (1-2)e^1 = -e$     Min:  $-e$