4.3

19) $y = \dfrac{x^3 - 2x^2 + x - 1}{x - 2}$

5) $y = x\sqrt{8 - x^2} = \overset{f}{x}\,\overset{g}{(8 - x^2)^{1/2}}$

$y' = (8 - x^2)^{1/2} + \frac{1}{\cancel{2}}(8 - x^2)^{-\frac{1}{2}}[-\cancel{2}x]\,x$

$= (8 - x^2)^{-1/2}\left[(8 - x^2) - x^2\right] = \dfrac{8 - 2x^2}{\sqrt{8 - x^2}}$

$8 - 2x^2 = 0$
$8 = 2x^2$
$4 = x^2$
$\pm 2 = x$

$\left(\sqrt{8 - x^2}\right)^2 = 0^2$
$8 - x^2 = 0$
$8 = x^2$
$\pm\sqrt{8} = x$

-2.5	0	2.5

$-\sqrt{8}$ $\quad -2 \quad 2 \quad \sqrt{8}$

9) $y = 2x^{1/5} + 3$
$y' = \frac{2}{5}x^{-4/5}$
$y'' = -\frac{8}{25}x^{-9/5} = 0$

$= \dfrac{-8}{25x^{9/5}} = 0$

CT y''	UP	DOWN
	+	−
	-1	1

0

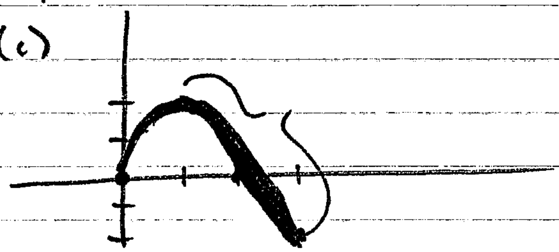
37) $y = \overset{f}{x}\,\overset{g}{e^x}$
$y' = e^x + xe^x$
$y'' = e^x + e^x + xe^x = 2e^x + xe^x$
$y''(-1) = 2e^{-1} - e^{-1}$
$= \frac{2}{e} - \frac{1}{e} = \frac{1}{e}$

$e^x + xe^x = 0$
$e^x(1 + x) = 0$
$e^x = 0 \qquad 1 + x = 0$
NEVER $\qquad x = -1$

MIN. $(-1, \frac{-1}{e})$

4.3

51) (c)



$x^3 + x$

$x(x^2 \quad)$

4.3 f g

5) $y = x\sqrt{8-x^2} = x(8-x^2)^{1/2}$

$y' = (8-x^2)^{1/2} + \cancel{\tfrac{1}{2}}(8-x^2)^{-1/2}[-\cancel{2}x]\, x = 0$

$= (8-x^2)^{1/2} - (8-x^2)^{-1/2}\, x^2$

$(8-x^2)^{-1/2}[(8-x^2) - x^2] = 0$

$\dfrac{1}{\sqrt{8-x^2}} = 0$

$\sqrt{8-x^2} \neq 0$

$8-x^2 \neq 0$

$8 \neq x^2$

$\pm\sqrt{8} \neq x$

$8 - x^2 - x^2 = 0$

$8 - 2x^2 = 0$

$8 = 2x^2$

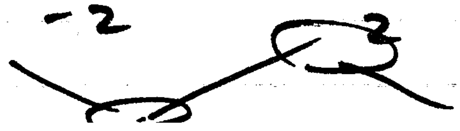
$4 = x^2$

$\pm 2 = x$

FDT

DECR	INCR	DECR
−	+	−
-2.01	0	2.01

$-\sqrt{8}$ -2 2 $\sqrt{8}$



4.3 f g

37) $y = xe^x$

$y' = e^x + xe^x$

$y'' = e^x + e^x + xe^x$

$= 2e^x + xe^x$

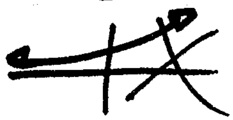
$y''(-1) = 2e^{-1} - e^{-1}$

$= e^{-1}$

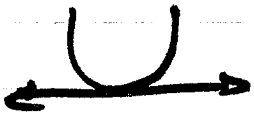
$e^x + xe^x = 0$

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

$e^x = 0 \qquad 1 + x = 0$



$x = -1$



LOCAL MIN $\left(-1, -\frac{1}{e}\right)$

$y(-1) = -1e^{-1}$

13) $y = xe^x$

$y' = e^x + xe^x$

$y'' = 2e^x + xe^x$

$2e^x + xe^x = 0$

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

$e^x = 0 \qquad 2 + x = 0$

X $\qquad x = -2$

y''	DOWN	UP
	$-$	$+$
	-3	-1
	-2	

INFL. PT. $\left(-2, -\frac{2}{e^2}\right)$

$y(-2) = -2e^{-2}$

15) $y = \tan^{-1} x$

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

$y'' = -(1+x^2)^{-2}[2x] = \frac{-2x}{(1+x^2)^2}$

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

$x = 0 \qquad$ X

$y(0) = \tan^{-1} 0$

y''	UP	DOWN
	$+$	$-$
	-1	1
	0	

INFL PT. $(0, 0)$