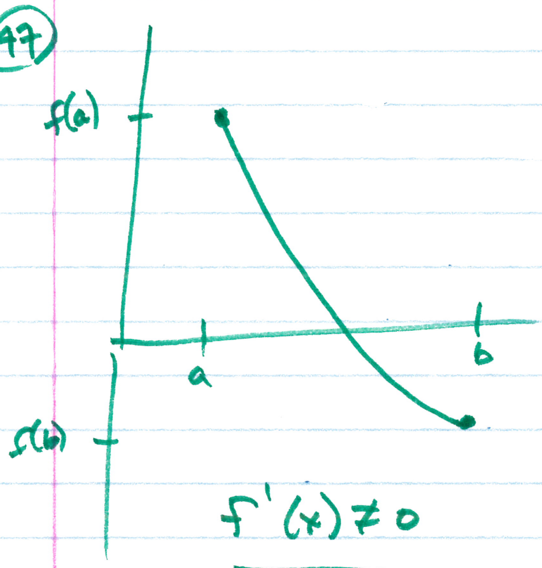
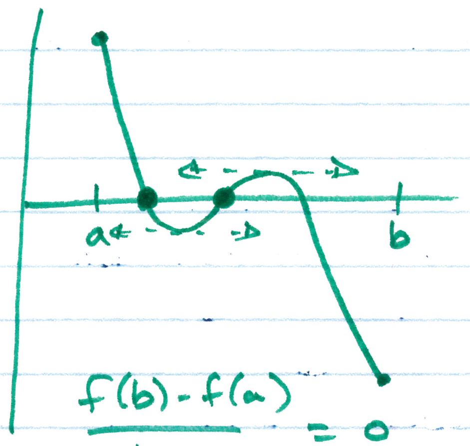
4.2

(47)





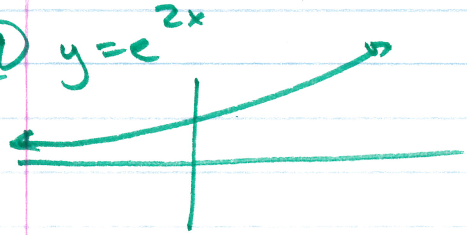
$$\frac{f(b)-f(a)}{b-a} = 0$$

$$f'(x) \neq 0$$

PROOF BY CONTRADICTION

(47) ASSUME TWO ZEROS. THE AVERAGE RATE OF CHANGE IS 0 ON THE INTERVAL BETWEEN THE ZEROS. BY MVT, AT SOME POINT ON THIS INTERVAL $f'(x) = 0$ BECAUSE THE FUNCTION IS CONTINUOUS AND DIFFERENTIABLE ON THIS INTERVAL. BUT $f'(x) \neq 0$ SO THERE CANNOT BE TWO ZEROS. Q.E.D.

(19) $y = e^{2x}$



(27) $f(x) = x^3 - 2x - 2\cos x$

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

$x = -1.1\ldots, .559$

INCR	DECR	INCR
8.1	-2.	2.6
-2	.5	1

-1.126 .559

4.2

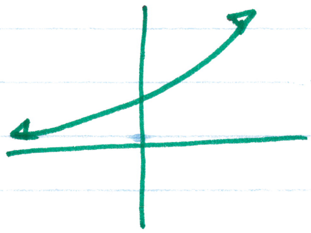
(19) $f(x) = e^{2x}$

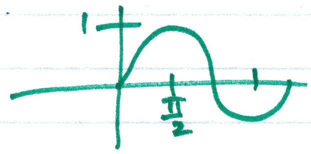
$f'(x) = 2e^{2x} = 0$

NO LOCAL EXTREMA

INCREASING: $(-\infty, \infty)$

DECREASING: ϕ





(5) $f(x) = \sin^{-1} x$

$\frac{f(b) - f(a)}{b - a}$

$\frac{\sin^{-1}(1) - \sin^{-1}(-1)}{1 - -1}$

$\frac{\frac{\pi}{2} - \left(-\frac{\pi}{2}\right)}{2} = \frac{\pi}{2}$

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

$\frac{2}{\pi} = \frac{\cancel{\pi}\sqrt{1 - x^2}}{\cancel{\pi}}$

$\left(\frac{2}{\pi}\right)^2 = \left(\sqrt{1 - x^2}\right)^2$

$\frac{4}{\pi^2} = 1 - x^2$

$-1 \qquad -1$

$\frac{4}{\pi^2} - 1 = -x^2$

$\sqrt{1 - \frac{4}{\pi^2}} = \sqrt{x^{\cancel{2}}}$

$\pm\sqrt{1 - \frac{4}{\pi^2}} = x$

$\boxed{c = \pm\sqrt{1 - \frac{4}{\pi^2}}}$

4.2

(25) $h(x) = \frac{-x}{x^2+4}$ f g

$$h'(x) = \frac{-(x^2+4) - (2x)(-x)}{(x^2+4)^2}$$

$$= \frac{-x^2-4+2x^2}{(x^2+4)^2}$$

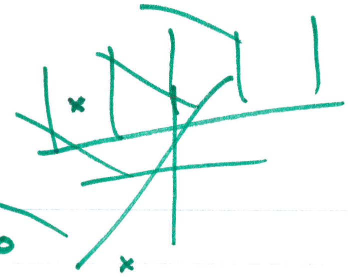
$$= \frac{x^2-4}{(x^2+4)^2}$$

$x^2-4=0$

$x=\pm 2$

$(x^2+4)^2 \neq 0$

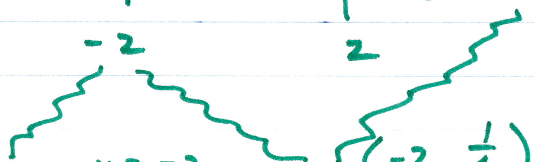
X



FDT

INCR.	DECR.	INCR.
+	−	+
-3	0	3

-2 2



LOCAL EXTREMA: LOCAL MAX $x=-2$ $(-2, \frac{1}{4})$

LOCAL MIN $x=2$ $(2, \frac{-1}{4})$

INCREASING: $(-\infty, -2) \cup (2, \infty)$

DECREASING: $(-2, 2)$

(27) $f(x) = x^3 - 2x - 2\cos x$

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

INCR.	DECR.	INCR.
+	−	+

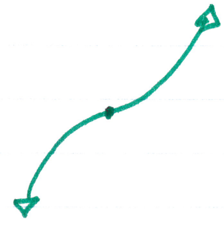
-1.1263 .55937217

LOCAL EXTREMA: LOCAL MIN $x=$ .559

LOCAL MAX $x=-1.1263$

INCREASING: $(-\infty, -1.1263) \cup (.55937217, \infty)$

DECREASING: $(-1.1263, .55937217)$



4.2

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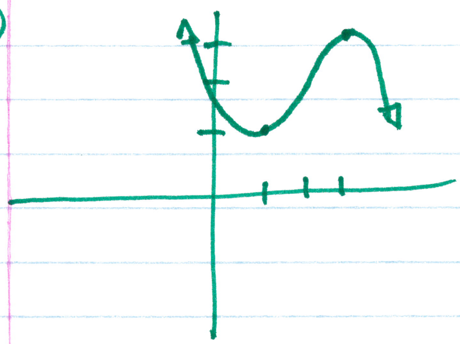

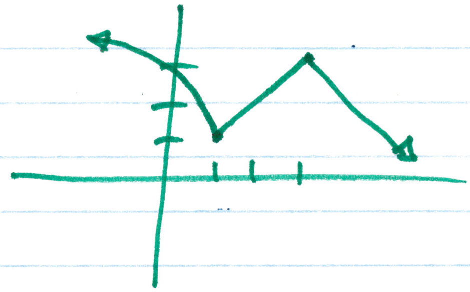

54

$g(x) = e^{x^3-6x^2+8}$

$g'(x) = e^{x^3-6x^2+8}\left[3x^2-12x\right]$

$+ \qquad +/-$

$3x^2-12x < 0$

$3x(x-4) < 0$

$x = 0, 4$