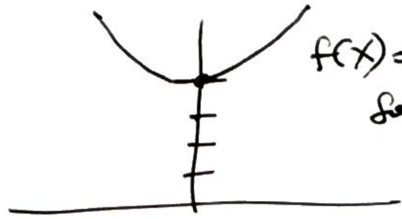
2.1 p108 60, 61, 64, 77*, 78 79, 85, 89 93

2.2 p118 5*, 9, 13, 17*, 21, 25, 27, 29, 33, 37, 41, 45, 51

2.1
(60) find the function with these characteristics:

$f(0)=4$
$f'(0)=0$
$f'(x)<0$ for $x<0$
$f'(x)>0$ for $x>0$



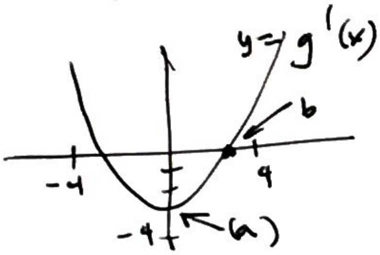
$f(x)=x^2+4$ for example

(61) Find tangent line equations

m at $(1,3) = \frac{2}{1}$ so $y-3=2(x-1)$

m at $(3,3) = \frac{-2}{1}$ so $y-3=-2(x-3)$

(64)



(a) $g'(0) = 3$

(b) $g'(3) = 0$

(c) If $g'(1) = -\frac{8}{3}$ g is decreasing w/ slope $-8/3$ when $x=1$

(d) If $g'(-4) = \frac{7}{3}$ at $x=-4$ g is increasing w/ slope $\frac{7}{3}$

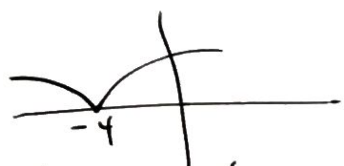
(e) $g(6)-g(4)$ both are pos, $g(6)>g(4)$ so this is pos.

(f) Can we find $g(2)$ from the graph of g'?

No, only the slope

(77) $f(x) = (x+4)^{2/3}$

$f'(x) = \frac{2}{3}(x+4)^{-1/3} = \frac{2}{3(x+4)^{1/3}}$



so not diff at $x=-4$

so $(-\infty,-4)\cup(-4,\infty)$

(78) $f(x) = \frac{x^2}{x^2-4} = \frac{x^2}{(x-2)(x+2)}$ not at $x=\pm 2$

$\{x \in \mathbb{R},\ x \neq \pm 2\}$

(79) $f(x) = \sqrt{x+1}+1$

not at $x=-1$, no left sided limit at end point

but okay for $x>1$

HW 1-11 page 2

2.1 p109

(85) Derivatives $x \to 1^-$ and $x \to 1^+$ is the function differentiable?

$f(x) = |x-1|$ no, from left is -1, from right is $+1$

(89)
$$f(x) = \begin{cases} x^2+1, & x \le 2 \\ 4x-3, & x > 2 \end{cases}$$
diff at $x = ?$

from left $f'(2) = 2(2) = 4$ $(f'(x) = 2x \text{ for } x \le 2)$

from right $f'(2) = 4$ $(f'(x) = 4 \text{ for all } x > 2)$

they match! so $f'(x) = 4$

(93) T or F? The slope of f at $(2, f(2))$ is:

$$\frac{f(2+\Delta x) - f(2)}{\Delta x}$$

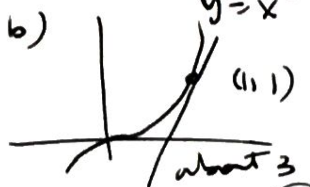
No, The slope is $\lim\limits_{\Delta x \to 0} \dfrac{f(2+\Delta x) - f(2)}{\Delta x}$

2.2 p118

(5*) (a) $y = x^{1/2}$ $\quad y' = \frac{1}{2} x^{-1/2} = \left.\frac{1}{2\sqrt{x}}\right|_{x=1} = \frac{1}{2}$

$m \approx \frac{1}{2}$

(b)



$y' = \left. 3x^2 \right|_{x=1} = 3$

Find Derivative

(9) $y = x^7$
$y' = 7x^6$

(13) $f(x) = x^{1/9}$
$f'(x) = \frac{1}{9} x^{-8/9}$
$= \dfrac{1}{9x^{8/9}}$

(17*) $y = -3t^2 + 2t - 4$
$y' = -6t + 2$

(21) $s(t) = t^3 + 5t^2 - 3t + 8$
$s'(t) = 3t^2 + 10t - 3$

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

(27) $y = \dfrac{2}{7x^4} = \dfrac{2}{7} x^{-4}$
$y' = \dfrac{-8}{7} x^{-5} = \dfrac{-8}{7x^5}$

(29) $y = \dfrac{6}{(5x)^3} = \dfrac{6}{125} x^{-3}$
$y' = \dfrac{-18}{125} x^{-4} = \dfrac{-18}{125x^4}$

2.2 p118 33, 37, 41, 45, 51

(33) $f(x) = -\frac{1}{2} + \frac{7}{5}x^3$

$f'(x) = \frac{21}{5}x^2\Big|_{x=0} = 0$

(37) $f(\theta) = 4\sin\theta - \theta$

$f'(\theta) = 4\cos\theta - 1$

$f'(0) = 4 - 1 = 3$

(41) $g(t) = t^2 - \frac{4}{t^3} = t^2 - 4t^{-3}$

$g'(t) = 2t + 12t^{-4} = 2t + \frac{12}{t^4}$

(45) $g(t) = \frac{3t^2 + 4t - 8}{t^{3/2}} = 3t^{1/2} + 4t^{-1/2} - 8t^{-3/2}$

$g'(t) = \frac{3}{2}t^{-1/2} - 2t^{-3/2} + 12t^{-5/2}$

$= t^{-5/2}\left(\frac{3}{2}t^{4/2} - 2t^{2/2} + 12\right)$

$= \frac{\frac{3}{2}t^2 - 2t + 12}{t^{5/2}}$

(51) $f(x) = 6\sqrt{x} + 5\cos x = 6x^{1/2} + 5\cos x$

$f'(x) = 3x^{-1/2} - 5\sin x$

$= \frac{3}{\sqrt{x}} - 5\sin x$