# FRQ Notes (p.25)

#2 $f(x) = \sqrt{1-\sin x} = (1-\sin x)^{1/2}$

a. need $1-\sin x \geq 0$

$-\sin x \geq -1$

$\sin x \leq 1$

$\boxed{\text{all real \#'s}}$

b. $f'(x) = \frac{1}{2}(1-\sin x)^{-1/2}(-\cos x)$

$= \dfrac{-\cos x}{2\sqrt{1-\sin x}}$

c. denominator $\neq 0$

exclude any x where $\sqrt{1-\sin x} = 0$

$1-\sin x = 0$

$\sin x = 1$

$\ldots, \frac{\pi}{2}, \frac{5\pi}{2}, \frac{9\pi}{2}$, etc.

$x \neq \frac{\pi}{2} + 2\pi \cdot n$, n is an integer

d. point $(0, f(0)) = (0, 1)$

slope $f'(0) = \dfrac{-\cos 0}{2\sqrt{1-\sin 0}} = \dfrac{-1}{2\sqrt{1}} = -\dfrac{1}{2}$

$y - 1 = -\frac{1}{2}(x - 0)$

$y = -\frac{1}{2}x + 1$

#5. a. $f(a+b) - f(a) = kab + 2b^2$ $\quad a=1 \; b=2$

$$f(3) - f(1) = k(1)(2) + 8$$

$$21 - 5 = 2k + 8$$

$$8 = 2k$$

$$k = 4$$

$$f(a+b) = 4ab + 2b^2 + f(a)$$

$\uparrow$ 3 $\quad\uparrow$ h

b. $$f'(3) = \lim_{h \to 0} \frac{f(3+h) - f(3)}{h}$$

$$= \lim_{h \to 0} \frac{4(3)(h) + 2h^2 + f(3) - f(3)}{h}$$

$$= \lim_{h \to 0} \frac{12h + 2h^2}{h}$$

$$= \lim_{h \to 0} (12 + 2h)$$

$$= \boxed{12}$$

c. $$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$= \lim_{h \to 0} \frac{4xh + 2h^2 + f(x) - f(x)}{h}$$

$$= \lim_{h \to 0} (4x + 2h)$$

$$= \boxed{4x} \qquad \boxed{f(x) = 2x^2 + C}$$ ← a constant