6.4 Day 2 (Monday 11/11)

Friday, November 8, 2019 10:14 AM

Section 6.4 Notes **Fundamental Theorem Part 1 Graph Problems**

Let $F(x) = \int_0^x f(t)dt$ where f is the function graphed below (all segments and a semicircle).

$F'(x) = \frac{d}{dx}\int_0^x f(t)dt = f(x)\cdot 1$

a) Evaluate F(-2), F(0), F(2), and F(7)

$F(-2) = \int_0^{-2} f(t)dt = -\int_{-2}^{0} f(t)dt = -(-\pi) = \pi$

$F(2) = \int_0^2 f(t)dt = \frac{1}{2}(2)(2) = \boxed{2}$

$F(0) = \int_0^0 f(t)dt = 0$

$F(7) = \int_0^7 f(t)dt = \frac{1}{2}(4)(2) - \frac{1}{2}(3)(3) = \frac{8}{2} - \frac{9}{2} = \boxed{\frac{-1}{2}}$

b) Identify all relative extrema of F in the interval (-6 ,7). Justify your answers.

★ $F'(x) = f(x) = 0$

c.p. $x = -4, 0, 4$

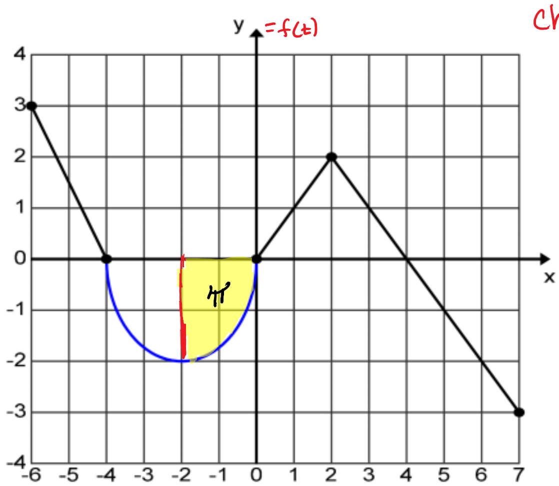
F(x) has a rel. max @ $x=4$ & $x=-4$, since $F'(x)=f(x)$ changed from + to − @ $x=4$ & $x=-4$.

F(x) has a rel. min @ $x=0$ since $F'(x)=f(x)$ changed from − to + @ $x=0$.

c) Identify all x-coordinates of the inflection points of F in the interval [-6,7]. Justify your answer.

$F''(x) = f'(x) \Rightarrow$ sign change

F has p.o.i.s @ $x = \pm 2$ since $F'' = f'$ changes signs @ $x = \pm 2$.



$[-3, 6]$

Let $F(x) = \int_0^x f(t)dt$ where f is the function graphed below (all segments and a semicircle).

a) Evaluate F(-8), F(-3), F(0), F(5), and F(6)

$F(-8) = \int_0^{-8} f(t)dt = -\int_{-8}^{0} f(t)dt = -\frac{9}{4}\pi - 12$

$F(5) = \int_0^{5} f(t)dt = \frac{9}{4}\pi - 3$

b) Identify all relative extrema of F on [-8, 6]. Justify your answer.

$F'(x) = f(x) = 0$

c. p. $x = \pm 3$

F has a rel max @ $x = 3$ since $F'(x) = f(x)$ changed from + to − @ $x = 3$

F has a rel min @ $x = -8$ b/c $x = -8$ is an endpt and $F' = f > 0$ to the right of $x = -8$.

F has a rel min @ $x = 6$ b/c $x = 6$ is an end pt. and $F' = f < 0$ to the left of $x = 6$.

c) Identify all x-coordinates of the inflection points of F in the interval [-8,6]. Justify your answer.

$F''(x) = f'(x) \Rightarrow$ changes sign

F has p.o.i.s at $x = -6, -3, 0, 5$ since $F'' = f'$ changes signs at those pts.