Section 5.4C 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).

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

$F(-2) = \int_0^{-2} f(t)dt = -\int_{-2}^{0} f(t)\,dt = -\left(-\frac{1}{4}\pi \cdot 2^2\right) = \boxed{\pi}$

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

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

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

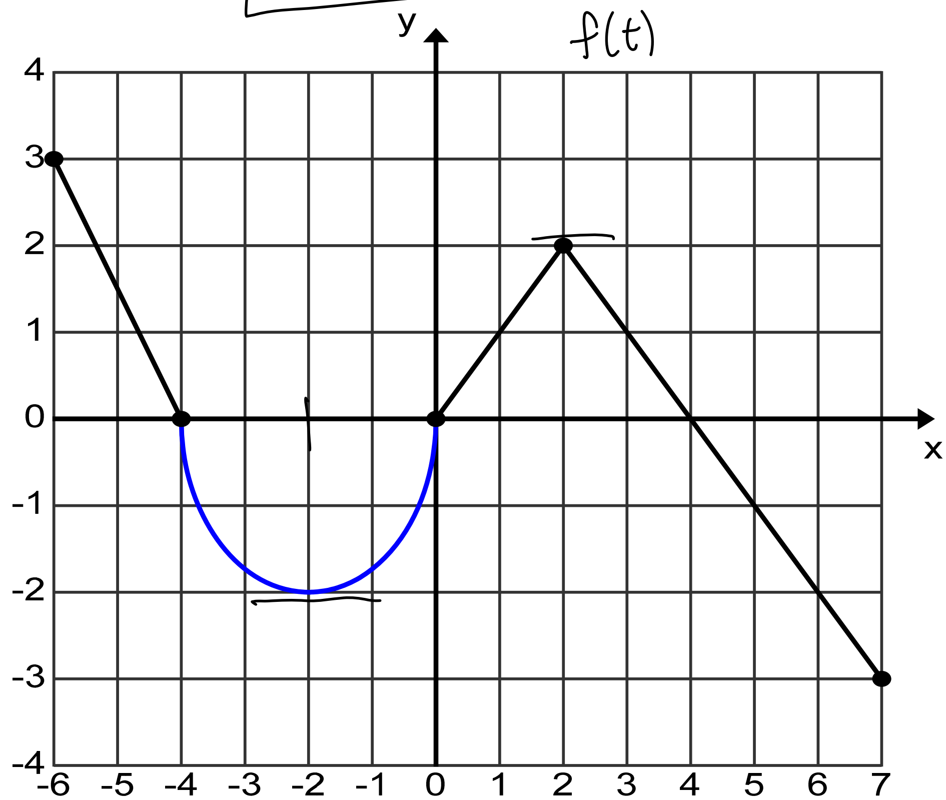
b) Identify all the critical points of F in the interval [-6,7].

$F'(x) = f(\cancel{x}) = 0 \leftarrow$ and sign change $\boxed{x = -4,\ 0,\ 4}$

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

$F''(x) = f'(\cancel{x}) = 0$ or $\emptyset$ $\leftarrow$ add slope change signs

$\boxed{x = -2,\ x = 2}$



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)

$F(-8) = \int_0^{-8} f(t)\,dt = -\int_{-8}^{0} f(t)\,dt = -\left(\frac{1}{2}(2+4)\cdot 2 + \frac{1}{2}3\cdot 4 + \frac{1}{4}\pi\cdot 3^2\right)$

$= -\left(6+6+\frac{9}{4}\pi\right) = \boxed{-12-\frac{9}{4}\pi}$

$F(-3) = -\int_{-3}^{0} f(t)\,dt = \boxed{-\frac{9}{4}\pi}$

$F(0) = \int_0^0 f(t)\,dt = \boxed{0}$

$F(5) = \int_0^5 f(t)\,dt = \frac{1}{4}\pi\cdot 3^2 - \frac{1}{2}2\cdot 3$

$= \boxed{\frac{9}{4}\pi - 3}$

$F(6) = \int_0^6 f(t)\,dt = \frac{9}{4}\pi - 3 - \frac{1}{2}(2+3)\cdot 1$

$= \boxed{\frac{9}{4}\pi - \frac{11}{2}}$

b) Identify all the critical points of F in the interval [-8,6].

$F'(x) = f(\cancel{x}) = 0 \leftarrow$ and sign change

$\boxed{x=3}$

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

$F''(x) = f'(x) = 0$ or $\varnothing$ $\leftarrow$ and slopes change sign

$\boxed{x=-6,\ x=-3,\ x=0,\ x=5}$