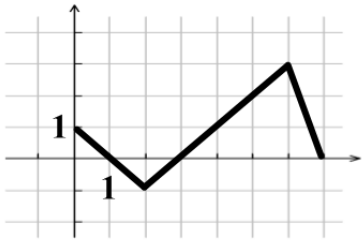
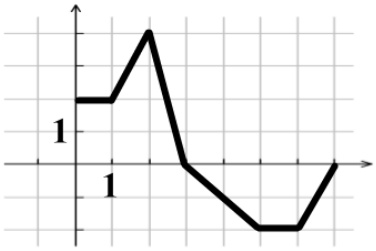
AP Calculus *name*_____*p*___
4.4 – 2nd Part of Fund. Thrm.
(Day 4 assignment)

1. Explain exactly what is meant by the statement that "differentiation and integration are inverse processes."

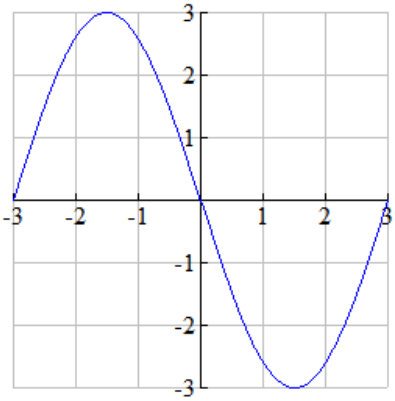
2. Let $g(x)=\int_0^x f(t)\,dt$, where f is the function whose graph is shown.
   a) Evaluate $g(x)$ for x = 0, 1, 2, 3, 4, 5, and 6.
   b) Estimate $g(7)$.
   c) Where does g have a maximum value?
   d) Where does g have a minimum value?



3. Let $g(x)=\int_0^x f(t)\,dt$, where f is the function whose graph is shown.
   a) Evaluate $g(0)$, $g(1)$, $g(2)$, $g(3)$, and $g(6)$.
   b) On what interval is g increasing?
   c) Where does g have a maximum value?



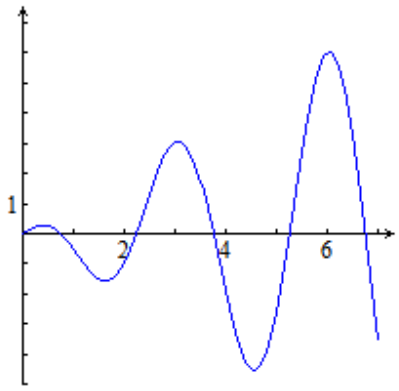
4. Let $g(x)=\int_{-3}^x f(t)\,dt$, where f is the function whose graph is shown.
   a) Evaluate $g(-3)$ and $g(3)$.
   b) Estimate $g(-2)$, $g(-1)$, and $g(0)$.
   c) On what interval is g increasing?
   d) Where does g have a maximum value?



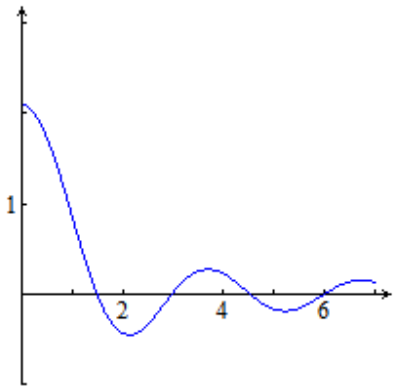
5. Let $g(x)=\int_0^x f(t)\,dt$, where f is the function whose graph is shown.

   a) At what values of x do the local maximum and minimum values of g occur?
   b) Where does g attain its absolute maximum value?
   c) On what intervals is g concave downward?

i.



ii.



6. Use the Fundamental Theorem of Calculus to find the derivative of the function.

a) $g(x)=\int_0^x \sqrt{1+2t}\ dt$

b) $g(y)=\int_2^y t^2 \sin t\ dt$

c) $F(x)=\int_x^{10} \tan\theta\ d\theta$

d) $h(x)=\int_2^{1/x} \arctan t\ dt$

e) $y=\int_3^{\sqrt{x}} \frac{\cos t}{t}\,dt$

f) $g(x)=\int_1^x \ln t\ dt$

g) $y=\int_{e^x}^0 \sin^3 t\ dt$

$\left(\text{Use book to find } \frac{d}{dx}\left(e^x\right)\right)$

h) $h(x)=\int_0^{x^2} \sqrt{1+r^3}\ dr$