

Name: \_\_\_\_\_

Calculus I

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Sections 5.2 and 5.3

1) Find the general indefinite integrals.

a)  $\int \frac{\sin x}{1 - \sin^2 x} dx$

hint:  $\sin^2 x + \cos^2 x = 1$

b)  $\int \left( -5e^{7x} + \frac{8}{x} \right) dx$

c)  $\int \left( \left( 1 - \frac{1}{\sqrt{x}} \right) \left( 1 + \frac{1}{\sqrt{x}} \right) \right) dx$

d)  $\int \frac{t^3 + 2t^2}{\sqrt{t}} dt$

e)  $\int \pi^3 dx$

f)  $\int \pi^3 x dx$

g)  $\int (\sin(t) + \cos(t) - \csc t \cot t) dt$

h)  $\int (\sec^2 t + t^2 + 2) dt$

i)  $\int \frac{\sin 2x}{\sin x} dx$

hint:  $\sin 2x = 2 \sin x \cos x$  (2 point)

2) Given the velocity function (in meters per second) for a particle along a line is  
 $v(t) = t^2 - 2t - 8$  ,  $1 \leq t \leq 6$

a) Graph the velocity function,

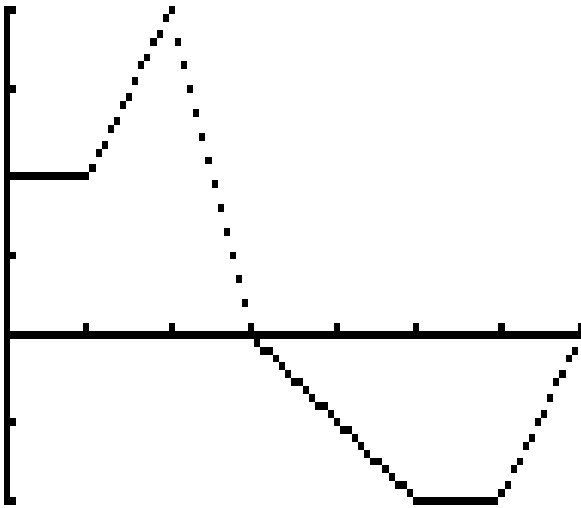
b) Find the displacement of the particle during the time interval  $1 \leq t \leq 6$  seconds

c) Find the distance traveled by the particle during the time interval  
 $1 \leq t \leq 6$  seconds

3) Let

$g(x) = \int_0^x f(t) dt$  where,  $x$  is in the closed interval 0 to 7, namely  $0 \leq x \leq 7$ , and  $f(t)$  is the function whose graph is shown below.

(Note:  $g'(x) = f(x)$  for  $0 < x < 7$ )



a) Evaluate  $g(0)$

b) Evaluate  $g(1)$

c) Evaluate  $g(2)$

d) Evaluate  $g(3)$

e) Evaluate  $g(5)$

f) Evaluate  $g(6)$

g) Evaluate  $g(7)$

b) On what interval is  $g(x)$  increasing?

c) On what interval is  $g(x)$  decreasing?

c) For what value does  $g(x)$  have a maximum value?

d) On what interval is  $g(x)$  concave upward?

e) On what interval is  $g(x)$  concave downward?