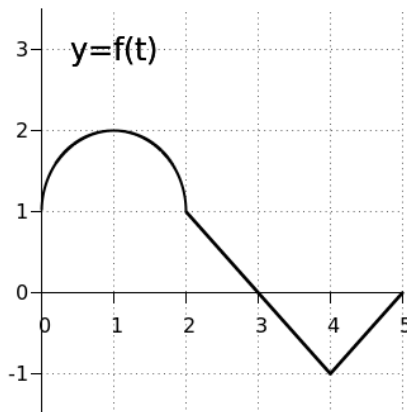


# MAC2311: Calculus 1 - Section 1

## Test 4 Review

April 15, 2015

1. Let  $g(x) = \int_0^x f(t) dt$  for  $0 \leq x \leq 5$ , where  $f$  is the function whose graph is shown below. The graph of  $f$  is made up of line segments and a semicircle.



- (a) Find  $g(5)$ .
- (b) On what interval(s) is  $g$  increasing? Write your answer using interval notation.
- (c) At what  $x$ -value(s) does  $g$  have an absolute maximum?
2. Express the limit  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{\cos x_i}{x_i} \Delta x$  as a definite integral on the interval  $[3\pi, 5\pi]$ . Do not evaluate.
3. Find the derivative of the function  $g(x) = \int_{2-3x}^5 \frac{u^3}{1+u^2} du$ .
4. Estimate the area under the graph of  $f(x) = \frac{1}{x}$  from  $x = 1$  to  $x = 7$  using the Midpoint Rule with three rectangles.
5. Use Newton's Method with initial approximation  $x_1 = 2$  to find  $x_2$ , the second approximation to the root of the equation  $x^3 - 2 = 0$ .
6. Find the general indefinite integrals.
- (a)  $\int \left( \frac{5x^3 - 6\sqrt{x}}{x} \right) dx$
- (b)  $\int \left( 3 + \frac{4}{\sqrt{1-x^2}} \right) dx$
- (c)  $\int x^3(1+x^4)^6 dx$
7. Evaluate the following definite integrals.
- (a)  $\int_{\pi/2}^{\pi/4} \csc x \cot x dx$
- (b)  $\int_1^2 x^3 \sqrt{x^2 + 1} dx$
8. A ball is thrown upward with a speed of 64 ft/s from the edge of a cliff 80 ft above the ground.

- (a) Find its height above the ground  $t$  seconds later.  
(Hint: the *downward* acceleration due to gravity is  $32 \text{ ft/s}^2$ .)
- (b) When does it reach its maximum height?
- (c) When does it hit the ground?
9. Find the area of the region enclosed by the curves  $x = 6y^2$  and  $x = 4 + 5y^2$ .
10. Given that  $\int_4^0 f(s) \, ds = -5$  and  $\int_0^6 f(t) \, dt = 10$ , find  $\int_4^6 [2f(x) + 1] \, dx$ .