

## Review Test 1

1. Evaluate

$$\lim_{h \rightarrow 0} \frac{\sec(3(x+h)) - \sec(3x)}{h}$$

- b.  $3 \sec(3x) \tan(3x)$
- c. 0
- d.  $\sec^2(3x)$
- e.  $3 \cot(3x)$
- f. nonexistent

2.

$$f(x) = \begin{cases} 2x + 3b & \text{if } x \leq 2 \\ 3ax^2 & \text{if } x > 2 \end{cases}$$

Let  $f$  be the function given above. What are all values of  $a$  and  $b$  for which  $f$  is differentiable at  $x = 2$  ?

- a.  $a = \frac{1}{6}$     $b = \frac{-2}{3}$
- b.  $a = \frac{1}{4}$  and  $b = \frac{1}{2}$
- c.  $a = \frac{1}{4}$  and  $b$  is any real number
- d.  $a = b + 2$ , where  $b$  is any real number
- e. There are no such values of  $a$  and  $b$

3. If the function  $f$  is continuous for all real numbers and if  $f(x) = \frac{x^2 - 25}{x - 5}$  when  $x \neq 5$ , then  $f(5) =$

- a. 10
- b. 5
- c. 25
- d. -5
- e. -1

4. Evaluate

$$\lim_{x \rightarrow e} \frac{\ln 2x - \ln 2}{x - e}$$

- a.  $\frac{1}{e}$
- b. 1

- c.  $e$
- d. Nonexistent

5.

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2 + \sin(4x)} =$$

- a. 0
- b. 2
- c. 1
- d. 3

6.

$$f(x) = \begin{cases} x^2 & \text{for } x < 3 \\ \frac{1}{3} & \text{for } x \geq 3 \end{cases}$$

If  $f$  is the function defined above, then  $\int_{-2}^4 f(x)dx$  is

- a. 12
- b.  $\frac{15}{2}$
- c.  $\frac{17}{2}$
- d. undefined

7.

$$\int_0^3 \frac{x^2 + 5x + 6}{x + 2} dx =$$

- a.  $\frac{27}{2}$
- b.  $3 + 2 \ln 2$
- c.  $\frac{15}{2} + 2 \ln 2$
- d.  $\frac{15}{2} + 2 \ln 3$

8.

$$\int \frac{\cos(\sqrt{x} + 1)}{\sqrt{x}} dx =$$

- a.  $2 \sin(\sqrt{x} + 1) + C$
- b.  $e^x \sin(e^x + 1) + C$
- c.  $e^x \sin(e^x + x) + C$

d.  $\frac{1}{2} \cos^2 (e^x + 1) + C$

9.

$$\int \frac{2x}{x^2 + 9} dx =$$

a.  $\ln(x^2 + 9)$

b.  $\frac{1}{2(x^2 - 4)} + C$

c.  $\frac{1}{2} \ln |x^2 - 4| + C$

d.  $2 \ln |x^2 - 4| + C$

e.  $\frac{1}{2} \arctan \left( \frac{x}{2} \right) + C$

10. The function  $g$  is continuous on the closed interval  $[2, 10]$ . If  $\int_9^1 g(x) dx = 25$  and

$$\int_1^5 \frac{1}{2} g(x) dx = -12, \text{ then } \int_5^9 g(x) dx =$$

a. -1

b. 62

c. 95

d. 190

11. Using the substitution  $u = 2x^2 + 1$ , the integral  $\int_2^4 2x (2x^2 + 1)^3 dx$  is equal to which of the following?

a.  $\frac{1}{2} \int_9^{33} u^3 du$

b.  $\int_{-2}^{13} u^5 du$

c.  $\frac{1}{2} \int_{-2}^{13} u^5 du$

d.  $2 \int_{-2}^{13} u^5 du$

e.  $\int_{-1}^4 u^5 du$

12.

$$\int \frac{9x + 1}{(2x + 1)(x - 3)} dx$$

a.  $\ln |2x + 1| + 4 \ln |x - 3| + C$

b.  $3 \ln |2x - 3| + 2 \ln |x + 2| + C$

c.  $3 \ln |2x - 3| - 2 \ln |x + 2| + C$

d.  $-\frac{6}{(2x - 3)^2} - \frac{2}{(x + 2)^2} + C$

13.

$$\int \frac{1}{x^2 - 16x + 80} dx =$$

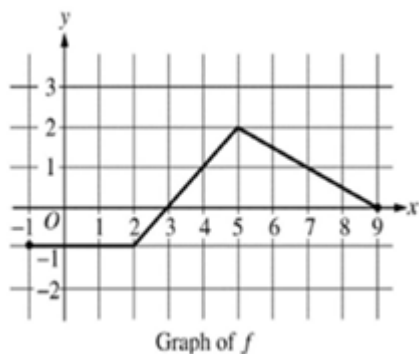
a.  $\frac{1}{4} \arctan \left( \frac{x - 8}{4} \right)$

b.  $\arctan \left( \frac{x - 5}{9} \right) + C$

c.  $\frac{1}{3} \arctan \left( \frac{x - 5}{3} \right) + C$

d.  $3 \arctan \left( \frac{x - 5}{3} \right) + C$

14. The graph of a piecewise linear function  $f$  is given.



What is the value of  $\int_1^7 (4f(x) - 1) dx$  ?

a. 8

b. 9.5

c. 27.5

d. 47

e. 48.5

15. Evaluate

$$\int_1^{\infty} x e^{-(x^2-1)} dx$$

a.  $\frac{e}{2}$

b.  $\frac{1}{2e}$

- c.  $\frac{1}{e}$
- d.  $\frac{2}{e}$
- e. divergent

16. Integrate

$$\int x^3 e^{2x} dx$$

- a.  $\frac{1}{8}e^{2x}(4x^3 - 6x^2 + 6x - 3) + C$