Review Test 1

1. Evaluate
$$\lim_{h\to 0} \frac{\sec(3(x+h)) - \sec(3x)}{h}$$
   a. $3\sec(3x)\tan(3x)$
   b. $3\sec^2(3x)$
   c. $3\sec(x)\tan(x)$
   d. $3\tan^2(3x)$
   e. $9\tan^2(3x)$

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. $a = \frac{1}{6} \quad b = \frac{-2}{3}$
   b. $a = \frac{-1}{6} \quad b = \frac{-2}{3}$
   c. $a = \frac{1}{3} \quad b = \frac{-2}{3}$
   d. $a = \frac{-1}{6} \quad b = \frac{1}{3}$
   e. $a = \frac{1}{6} \quad b = \frac{-1}{3}$

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 $f5) =$
   a. 10
   b. 5
   c. 25
   d. -5
   e. -10

4. Evaluate
$$\lim_{x\to e} \frac{\ln 2x - \ln 2}{x - e}$$
   a. $\frac{1}{e}$
   b. 1
   c. e
   d. $2e$
   e. $\frac{2}{e}$

5.
$$\lim_{x\to 0} \frac{1 - \cos x}{x^2 + \sin(4x)} =$$
   a. 0

b. π

c. 1

d. -1

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

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. $\frac{20}{3}$

c. $\frac{28}{3}$

d. 13

3. $\frac{-28}{3}$

7.

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

a. $\frac{27}{2}$

b. $4 + 2\ln 2$

c. $\frac{15}{2}$

d. $\frac{15}{2} + 2\ln 2$

e. $\frac{17}{2} - 2\ln 2$

8.

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

a. $2\sin(\sqrt{x}+1) + C$

b. $\frac{1}{2}\sin(\sqrt{x}+1) + C$

c. $\ln|cos(\sqrt{x}+1) + C$

d. $\ln|sin(\sqrt{x}+1) + C$

e. $\cos(\sqrt{x}+1) + C$

9.

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

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

b. $\frac{1}{2}\ln(x^2+9) + C$

c. $\dfrac{1}{x^2+9}+C$

d. $\dfrac{2}{(x^2+9)}+C$

e. $\dfrac{x}{3}\arctan\left(\dfrac{x}{3}\right)+C$

10. The function g is continuous on the closed interval $[2,10]$. If $\displaystyle\int_9^1 g(x)dx=25$ and $\displaystyle\int_1^5 \frac{1}{2}g(x)dx=-12$, then $\displaystyle\int_5^9 g(x)dx=$

a. -1

b. 49

c. 1

d. 13

e. -13

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

a. $\dfrac{1}{2}\displaystyle\int_9^{33} u^3\,du$

b. $2\displaystyle\int_9^{33} u^5 du$

c. $\dfrac{1}{2}4\displaystyle\int_9^{33} u^5 du$

d. $2\dfrac{1}{2}\displaystyle\int_9^{33} u^5 du$

e. $\dfrac{1}{4}\displaystyle\int_9^{33} u^5 du$

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

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

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

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

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

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

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

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

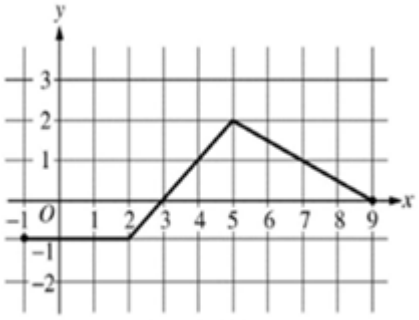
b. $\dfrac{1}{6}\arctan\left(\dfrac{x-8}{6}\right)+C$

c. $\dfrac{x}{6}\arctan\left|\dfrac{x-8}{6}\right|+C$

d. $\dfrac{1}{\ln|x^2-16x+80|}+c$

e. $2\ln|x-20|-4\ln|+4|+C$

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



Graph of f

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

a. 8

b. 9.5

c. 27.5

d. 47

e. 48.5

15. Evaluate

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

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

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

c. $\dfrac{1}{e}$

d. $\dfrac{2}{e}$

e. divergent

16. Integrate

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

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