

Math 132: Calculus II
Midterm Test 1

ANSWERS PROVIDED
at the end

Wednesday, 4 February 2015
15 Problems on 1+ 15 +1 Pages

You may not use any reference materials or electronic devices.

1. Approximate

$$\int_0^3 \frac{1}{x+1} dx$$

using a Riemann sum with 3 equal subintervals, evaluating the function at the left endpoints of the subintervals.

- (a) $5/6$
- (b) $11/6$
- (c) $15/6$
- (d) $5/12$
- (e) $13/12$
- (f) $17/12$

2. Which of these is an antiderivative of $f(x) = \sin 2x + \cos 3x$:

(a) $2 \cos 2x + 3 \sin 3x$

(b) $2 \cos 2x - 3 \sin 3x$

(c) $3 \sin 3x - 2 \cos 2x$

(d) $\frac{1}{2} \sin 2x + \frac{1}{3} \cos 3x$

(e) $\frac{1}{2} \cos 2x - \frac{1}{3} \sin 3x$

(f) $\frac{1}{3} \sin 3x - \frac{1}{2} \cos 2x$

3. Evaluate

$$\int_0^1 e^{-5x} dx$$

(a) $(1 - e^{-5})/5$

(b) $(1 + e^{-5})/5$

(c) $1/5 - e^{-5}$

(d) $1/5 + e^{-5}$

(e) $1 - e^{-5}/5$

(f) $1 + e^{-5}/5$

4. Evaluate

$$\int_1^2 \frac{2+x}{\sqrt{x}} dx$$

- (a) $\sqrt{2} - 1$
- (b) $3\sqrt{2} - 3$
- (c) $\frac{16}{3}\sqrt{2} - \frac{14}{3}$
- (d) $\frac{14}{3}\sqrt{2} - \frac{16}{3}$
- (e) $16\sqrt{2} - 14$
- (f) $14\sqrt{2} - 16$

5. Evaluate the integral

$$\int_{-3}^1 |x + 2| dx$$

- (a) 2
- (b) 3
- (c) 7/2
- (d) 4
- (e) 9/2
- (f) 5

6. If $\int_1^3 f(x) dx = 7$ and $\int_2^3 f(x) dx = 2$, evaluate $\int_1^2 (1 - 2f(x)) dx$

(a) 11

(b) 9

(c) 5

(d) -5

(e) -9

(f) -11

7. Evaluate

$$\int_0^\pi x \cos(2x^2 + 1) dx$$

- (a) $\sin(2\pi^2 + 1) - \sin(1)$
- (b) $\sin(2\pi^2 + 1) + \sin(1)$
- (c) $\frac{1}{4} \sin(2\pi^2 + 1) - \frac{1}{4} \sin(1)$
- (d) $\frac{1}{4} \sin(2\pi^2 + 1) + \frac{1}{4} \sin(1)$
- (e) $\frac{1}{2} \sin(2\pi^2 + 1) - \frac{1}{2} \sin(1)$
- (f) $\frac{1}{2} \sin(2\pi^2 + 1) + \frac{1}{2} \sin(1)$

8. For some constant $k > 0$, the function $f(x) = k/(1 + x^2)$ is a probability density on $[0, \infty)$. Find k .

(a) π

(b) $1/\pi$

(c) $\pi/2$

(d) $2/\pi$

(e) 2π

(f) $\frac{1}{2\pi}$

9. A particle moves on a line with velocity function $v(t) = 100 - 9.8t$. What is its displacement from $t = 0$ to $t = 2$?

(a) 190.2

(b) 180.4

(c) 170.6

(d) 160.8

(e) 151.0

(f) 141.2

10. Compute the general antiderivative

$$\int \frac{e^{1/x}}{x^2} dx$$

- (a) $\frac{1}{x}e^{1/x} + C$
- (b) $-\frac{1}{x}e^{1/x} + C$
- (c) $e^x + C$
- (d) $-e^x + C$
- (e) $e^{1/x} + C$
- (f) $-e^{1/x} + C$

11. Evaluate

$$\int_{-\pi/4}^{\pi/4} \frac{\sin x}{\cos^9 x} dx$$

- (a) $\sqrt{2}$
- (b) $\sqrt{2}/2$
- (c) 1
- (d) 0
- (e) $\sqrt{2^8}$
- (f) $1/\sqrt{2^8}$

12. Suppose that

$$F(t) = \int_0^t (2 - x^2) dx, \quad t \geq 0$$

Find t such that $F(t)$ is maximal.

- (a) 0
- (b) 1
- (c) $1/2$
- (d) $\sqrt{2}$
- (e) 2
- (f) $2\sqrt{2}$

13. Express

$$\int_0^1 \frac{x^2 + 1}{\sqrt{x^3 + 3x}} dx$$

as an integral in u using the substitution $u = x^3 + 3x$.

(a) $\int_0^1 u^{-1/2} du$

(b) $\int_0^4 u^{-1/2} du$

(c) $\frac{1}{3} \int_0^1 u^{-1/2} du$

(d) $\frac{1}{3} \int_0^4 u^{-1/2} du$

(e) $\int_0^1 u^{1/2} du$

(f) $\int_0^4 u^{1/2} du$

14. If

$$g(t) = \int_1^t \frac{\cos x}{x} dx, \quad t \geq 1,$$

then what is $g'(\pi/2)$?

- (a) π
- (b) $\pi/2$
- (c) $1/\pi$
- (d) $2/\pi$
- (e) 1
- (f) 0

15. Find the area of the region in the first quadrant that lies **above** the graph of $y = x^{-3}$ and **below** the graph of $y = x^{-2}$.

(a) 2

(b) $1/2$

(c) 1

(d) $2/3$

(e) $3/2$

(f) The area is infinite.

Correct answers:

[1] "b"

[2] "f"

[3] "a"

[4] "c"

[5] "f"

[6] "e"

[7] "c"

[8] "d"

[9] "b"

[10] "f"

[11] "d"

[12] "d"

[13] "d"

[14] "f"

[15] "b"