

MATH 75B

Test 3

December 4, 2009

**This test is to be taken on a furlough day.
It is take-home, self-check, and not part of your grade.**

Name: _____

- No books or calculators are allowed.
- You may use the unit circle. However, no other notes are allowed.
- You may need the following formula: $1 + 2 + \dots + n = \frac{n(n+1)}{2}$.
- Please show all your work for problems 7-12.

Multiple choice questions: circle the correct answer

1. $\int_{-1}^1 x^2 dx =$
A. $-\frac{2}{3}$ B. 0 C. $\frac{2}{3}$ D. undefined
E. none of the above
2. Find the derivative of $f(x) = \int_x^3 \cos(\sqrt{t}) dt$.
A. $-\cos(\sqrt{x})$ B. $\cos(\sqrt{x})$ C. $\cos(\sqrt{3}) - \cos(\sqrt{x})$ D. $\frac{\sin(\sqrt{t})}{2\sqrt{t}}$
E. none of the above
3. If $f(x)$ is always increasing, which choice of the sample points for the Riemann sum will give the best approximation of $\int_a^b f(x) dx$?
A. Right endpoints of all subintervals B. Left endpoints C. Midpoints
D. It depends on whether a and/or b are positive or negative
E. It depends on whether $f(x)$ is positive or negative
4. If a Riemann sum with 6 subintervals of equal length is used to estimate $\int_{-3}^9 \sqrt[4]{x} dx$, what is Δx ?
A. 0 B. 1 C. 2 D. 6 E. 12
5. Which of the following properties is correct?
A. $\int f(x)g(x)dx = \left(\int f(x)dx\right) \left(\int g(x)dx\right)$
B. $\int \frac{1}{f(x)} dx = \frac{1}{\int f(x)dx}$ C. $\int_{-a}^0 f(-x)dx = \int_0^a f(x)dx$
D. $\int_a^b f(x)dx = \int_b^a f(x)dx$ E. $\int_0^a f(x)dx = -\int_{-a}^0 f(x)dx$
6. Find the area of the region bounded by $y = 0$, $x = 2$, $x = 5$, $y = x + 1$, and $y = 7 - x/2$.
A. 11.25 B. 11.5 C. 12.25 D. 12.75
E. none of the above

Regular problems: show all your work

7. Use the definition of the integral to evaluate $\int_0^3 2x dx$.

8. Evaluate the integral $\int_0^3 2x dx$ (notice that this is the same integral as in the previous problem) in two more ways (and check that all three of your answers are the same):

(a) interpreting it in terms of areas

(b) using an antiderivative

9. Evaluate $\int x^2 \sin(x^3) dx$

10. Evaluate $\int_{-2}^0 \sqrt{4-x^2} dx$

11. A car with initial speed 60 ft/sec (approximately 40 mi/h) is slowing down at a constant deceleration and comes to a complete stop in 10 seconds. Find the distance traveled by the car while slowing down.

12. If $\int_0^5 f(x) = 6dx$ and $\int_0^{10} 2f(x)dx = 18$, find $\int_5^{10} (f(x) + 1)dx$.