

Calc II - Prep for the midterm exam

Our midterm will be this Friday, June 25. This will be an *in class* exam and you'll have the full class period to do it.

This quiz will be you, paper, and pencil. Calculators will not be needed or permitted.

The structure of the quiz might look something like the following, though the problems will certainly be different.

1. Compute the following integrals.

(a) $\int_0^1 x^2(x+4)^{10} dx.$

(b) $\int x^2 \frac{(x+4)^{10}}{x^2} dx.$

(c) $\int_0^{2\pi} \sin^2(x) \cos^2(x) dx.$

(d) $\int \sin^2(x) \cos^5(x) dx.$

(e) $\int_0^{2\pi} \sin^{99}(x) dx.$

(f) $\int x \cos(3x) dx.$

(g) $\int x^2 e^{4x} dx.$

(h) $\int \ln(x) dx.$

(i) $\int_0^{\infty} \frac{4}{(x+1)^3} dx.$

2. Suppose we wish to estimate

$$\int_0^2 \sin(2x) dx$$

using a *midpoint sum*.

- (a) Write down the midpoint sum with n terms.
- (b) Determine how large n must be to ensure that our estimate is within 0.001 of the actual value.

3. Figure 1 shows the graph of $f(x) = x(1 - x)$.
- (a) Set up an integral representing the volume of the solid of revolution obtained by revolving the shaded region around the x -axis.
 - (b) Set up an integral representing the volume of the solid of revolution obtained by revolving the shaded region around the y -axis.
 - (c) Set up an integral representing the arc length of the portion of the graph over the x -axis.
4. Suppose that exam scores are normally distributed with a mean of 81 and a standard deviation of 12.

- (a) Let X denote the score of a randomly chosen exam. Express

$$P(70 < X < 90)$$

as a normal integral.

- (b) Translate your normal integral above to a standard normal integral.

5. I have a 10 sided die with

- three sides labeled 1,
- four sides labeled 2, and
- three sides labeled 3.

- (a) Write down a computation showing that the expected value of one roll of this die is 2.
- (b) Write down a computation showing that variance associated with one roll of this die is $3/5$. What's the corresponding standard deviation?
- (c) Suppose I roll the die 100 times add the rolls together and call the result S .
- i. What is the expected value of S ?
 - ii. What is the standard deviation of S ?
 - iii. Write down a normal integral representing $P(190 < S < 205)$.

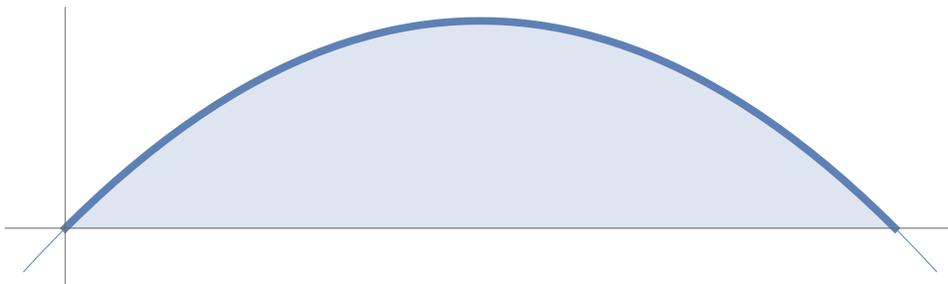


Figure 1: The graph of $f(x) = x(1 - x)$