Calculus II Course Notes

Math 129 - 01
Spring 2016

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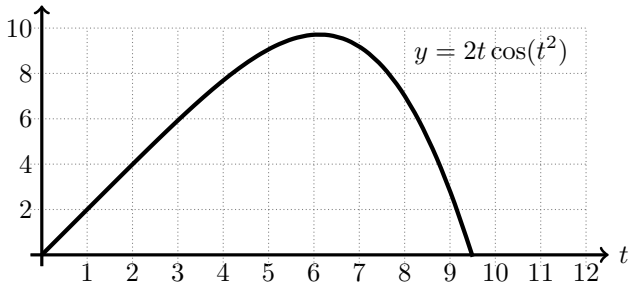
Unit 1: Sections 7.1 - 7.5

A review problem from Calculus I

1. Let $F(x)$ be a function that represents the area under the curve $y = 2t\cos(t^2)$ between $t = 0$ and $t = x$. Illustrate $F(x)$ on the graph below for $x = 4$.



2. Give an expression for $F(x)$.
(Hint: Your answer will include an integral.)

3. Simplify your expression in 2.

4. Use a left Riemann sum with $n = 4$ to estimate $F(8)$. How can you check your answer?

5. Is $F(x)$ increasing or decreasing on $0 \leq x \leq \sqrt{\pi}$?

6. What is the name of the theorem that explains the relation between 1. and 5.?

7. Is $F(x)$ concave up or concave down for $x = \sqrt{\pi}$?

Substitution

Section 7.1
August 23, 2016

Name:
Math 129 - 01

Understand	Explain how integration by substitution reverses differentiation by the chain rule.
Understand	Identify integrals in the form $f'(g(x))\,g'(x)$.
Understand	Pick the correct substitution (Let $w =$ "inner" function).
Apply	Find antiderivatives by solving for dw and complete the substitution.
Apply	Correctly change limits to the new variable when evaluating definite integral.
Synthesize	Use substitution when integrating functions expressed in a table.
Synthesize	Develop best mathematical practices by using differentiation to check antiderivatives.

Some integrals are candidates for solving by substitution and some are not.

1. Circle which of the following are suitable candidates for substitution.

$$\int x^2(1+2x^3)^2\,dx \qquad \int y^3\,e^{y^2}\,dy \qquad \int \frac{\big(\ln(z)\big)^2}{z}\,dz$$

2. For each of the suitable canditates in 1, identify the correct substitution.
(i.e. Find $w =$?? and solve for $dw =$??).

3. For each of the unsuitable canditates in 1, explain in words why substitution will not work.

4. Attempt a substitution on the unsuitable canditates and clearly show where the calculation breaks down.

Quiz (Leave this space blank)