Math 21B
Vogler
Worksheet 8

1.) Sally is 5 years old and her grandmother gives her \$1000 to deposit in a savings account. If Sally leaves all that money in her account for 50 years, how much money will be in the account if the annual interest rate is $r = 5.25\%$ and interest is

a.) computed as simple interest ?

b.) compounded

i.) annually ?

ii.) monthly ?

iii.) weekly ?

iv.) daily ?

v.) hourly ?

vi.) every minute ?

vii.) every second ?

c.) compounded continuously ?

2.) If \$2000 is to grow to \$2500 in a money market account, how long will it take if interest is compounded continuously and the annual interest rate is $r = 4.5\%$?

3.) Assume that \$1000 grows to \$2000 in a certificate of deposit at the Big Bucks Bailout National Bank. If it takes 7 years and interest is compounded monthly, what is the annual interest rate r ?

4.) Use any method to determine the following indefinite integrals (antiderivatives).

a.) $\int \arcsin x \, dx$ b.) $\int \sin \sqrt{x} \, dx$ c.) $\int \ln x \, dx$ d.) $\int x(\ln x)^2 \, dx$

e.) $\int \sec^5 x \tan^3 x \, dx$ f.) $\int \sec^2 x \tan^2 x \, dx$ g.) $\int (\cot^2 x + \tan^2 5x) \, dx$

h.) $\int (\sec 3x - \csc(x/2)) \, dx$ i.) $\int \sin^2 4x \, dx$ j.) $\int \sin^3 x \, dx$ k.) $\int \sin 3x \, dx$

l.) $\int \frac{\sec^3 x}{\tan x} \, dx$ m.) $\int \cos^3 x \sin^2 x \, dx$ n.) $\int \frac{1}{\sqrt{x}\sqrt{1-x}} \, dx$ o.) $\int (1 + \cos\theta)^3 \, dx$

p.) $\int \frac{1-x}{\sqrt{1-4x^2}} \, dx$ q.) $\int (4x+3)^{125/7} \, dx$ r.) $\int \sec x \tan x \, dx$ s.) $\int \sec^2 x \tan x \, dx$

t.) $\int \sec^5 x \tan x \, dx$ u.) $\int \frac{1}{\sin x \cos x} \, dx$ v.) $\int_{\pi/3}^{\pi/2} \sqrt{1 + \cos x} \, dx$ w.) $\int \frac{1}{1 + \cos x} \, dx$

5.) Compute the area of the region bounded by the graphs of $y = xe^x$, $y = 0$, and $x = \ln 4$.

6.) Find the following antiderivative three ways, a.) using u-substitution, b.) using integration by parts, c.) using trig substitution : $\int x^3\sqrt{1-x^2}\,dx$

7.) Find the following integrals by using integration by parts twice with a twist :

a.) $\int e^{2x}\sin x\,dx$ b.) $\int \sin 3x\ \cos 2x\,dx$

8.) Find the average value of $f(x) = x\ln x$ on the interval $[1, e]$.

9.) Use trig substitution to integrate the following.

a.) $\int x^2\cdot\sqrt{1-x^2}\,dx$ b.) $\int \frac{1}{x\sqrt{x^2+9}}\,dx$ c.) $\int x^3\cdot\sqrt{x^2-4}\,dx$

10.) Use integration by parts to write a recursion (reduction) formula for each of the following (n is a positve integer and b is a constant).

a.) $\int x^n e^{bx}\ dx$ b.) $\int \sec^n(bx)\ dx$ (HINT: $1+\tan^2\theta = \sec^2\theta$)

THE FOLLOWING PROBLEM IS FOR RECREATIONAL PURPOSES ONLY.

11.) A nonnegative integer I is a perfect square, triangular (PST) number if I is equal to the square of a nonnegative integer AND is also equal to one-half the product of consecutive nonnegative integers. Find the first four PST numbers.

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