MATH 106 CALCULUS I FOR BIO. & SOC. SCI. FALL 2012

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Homework 9.

Please show all your work.

(1) Find the most general antiderivative of the following functions:

(a) $f(x) = x^3 + \dfrac{2}{x^3}$.

(b) $g(x) = \sqrt{x} + \sqrt[3]{x} + \sqrt[4]{x}$.

(c) $h(x) = \sec^2(2x)$.

(2) Compute the following integrals:

(a)
$$\int \left(e^{-3x} + \frac{2}{x}\right) dx.$$

(b)
$$\int_0^1 \left(\frac{1}{1+x^2}\right) dx.$$

(3) Solve the following initial value problem.
$$\frac{dy}{dt} = \sin(\pi t) + t, \text{ with } y(0) = 2.$$

(4) Find the following quantities:

(a) Find the area under the graph of $f(x) = x + \sqrt{x}$, for $1 \leq x \leq 2$.

(b) Find the area of the region bounded by the curves $y = 4 - x^2$ and $y = x^2$.

(5) Find the derivative of the following functions.

(a)
$$F(x) = \int_0^{x^2} \sqrt{2+t}dt$$

(b)
$$G(x) = \int_1^{e^x} \ln(t)dt.$$