MATH 108 – QUIZ 13 – 27 APRIL 2011

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (2 pts. each) Find the indicated integrals. Don't forget the "$+C$."

(a) $\int \frac{2}{\sqrt{t}}\,dt$ $= \int 2t^{-1/2}\,dt = 2(2t^{1/2}) + C$

$= 4t^{1/2} + C$ //

(b) $\int x^{1/2}(2x+1)\,dx$ $= \int 2x^{3/2} + x^{1/2}\,dx$

$= 2\left(\frac{2}{5}x^{5/2}\right) + \frac{2}{3}x^{3/2} + C = \frac{4}{5}x^{5/2} + \frac{2}{3}x^{3/2} + C$

(c) $\int \frac{x+1}{x}\,dx$ $= \int \left(1 + \frac{1}{x}\right) dx = x + \ln(x) + C$ //

(d) $\int 5e^{-4x}\,dx$ $= 5\left(-\frac{1}{4}e^{-4x}\right) + C = -\frac{5}{4}e^{-4x} + C$ //

2. (3 pts.) Find the function $f(x)$ that satisfies $f'(x) = 3x^2 + 6x$ and whose graph passes through the point $(1, 3)$.

$f(x) = \int (3x^2 + 6x)\,dx = x^3 + 3x^2 + C$

$f(1) = 3$ $\quad\therefore 4 + C = 3$

$f(1) = 1 + 3 + C = 4 + C$ $\quad C = -1$

$\therefore f(x) = x^3 + 3x^2 - 1$ //

V1

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1. (2 pts. each) Find the indicated integrals. Don't forget the "$+C$."

(a) $\int (t^{1/3} + t^{-1/3})\, dt$ $= \frac{3}{4}t^{4/3} + \frac{3}{2}t^{2/3} + C$ //

(b) $\int u^2 \left(\frac{1}{u} + 1\right) du$ $= \int (u + u^2)\, du$

$= \frac{1}{2}u^2 + \frac{1}{3}u^3 + C$ //

(c) $\int \frac{x+1}{\sqrt{x}}\, dx$ $= \int \frac{x+1}{x^{1/2}}\, dx = \int (x^{1/2} + x^{-1/2})\, dx$

$= \frac{2}{3}x^{3/2} + 2x^{1/2} + C$ //

(d) $\int 3e^{3x}\, dx$ $= 3\int e^{3x}\, dx = 3 \cdot \frac{1}{3}e^{3x} + C = e^{3x} + C$ //

2. (3 pts.) Find the function $f(x)$ that satisfies $f'(x) = 3 - 6x^2$ and whose graph passes through the point $(1, 5)$.

$f(x) = \int (3 - 6x^2)\, dx = 3x - 2x^3 + C$

$f(1) = 5$ $\qquad 1 + C = 5$

$f(1) = 3 - 2 + C = 1 + C$ $\qquad C = 4$

$\therefore f(x) = 3x - 2x^3 + 4$ //

V2