Math 122 Applied Calculus II Soln
Spring 2011 Quiz 3
Instructor: Shawn Rafalski **Write your name on this quiz**

(If your name is Eddie, then write "+1" in big script at the top of this quiz.)

1. (2 points each) Compute the following indefinite integrals. Do not simplify the answers.

(a) $\int (3x^2 + 2)\, dx = \frac{3x^3}{3} + 2x + C = \boxed{x^3 + 2x + C}$

(b) $\int (e^x + x^7)\, dx = \boxed{e^x + \frac{x^8}{8} + C}$

(c) $\int dy = \boxed{y + C}$

(d) $\int (4e^{2z} - 7z)\, dz = \frac{4e^{2z}}{2} - \frac{7z^2}{2} + C$

$= \boxed{2e^{2z} - \frac{7}{2}z^2 + C}$

(turn this page over)

2. (2 points) Compute the velocity function $v(t)$ for an object that is thrown downward, if you know that the initial downward velocity at time $t = 0$ seconds is -10 ft/sec.

initial condition: $v(0) = -10$

We know $a(t) = -32$ & $v'(t) = a(t)$. So integrate:

$$v(t) = \int a(t)\,dt = \int -32\,dt = -32t + C.$$

So $v(t) = -32t + C$. Since $v(0) = -10$ (init. cond.)

and $v(0) = -32 \cdot 0 + C = C$, we know $C = -10$.

So $\boxed{v(t) = -32t - 10}$

3. (BONUS! 1 point) Compute the indefinite integral $\int 4x^2 e^{2x^3}\,dx$

Subst:

$u = 2x^3$

$du = 6x^2\,dx$

$\frac{3}{3}du = 4x^2\,dx$

$$\rightsquigarrow \int \underbrace{4x^2 e^{2x^3}}_{e^u}\,dx = \int \frac{3}{3} e^u\,du$$

$$= \frac{3}{3} e^u + C$$

$$\boxed{\frac{3}{3} e^{2x^3} + C}$$