PROBLEM SET 7. DUE THURSDAY, 14 SEPTEMBER

Reading. *Quick Calculus*, pp. 167–170; review 151–185.
Supplementary reading. Simmons, sections 7.2 and 10.7.

1. (3pts) Compute the following definite integrals.
   (a) $\int_0^1 x(x^2+2)^3\ dx$
   (b) $\int_0^1 xe^x\ dx$
   (c) $\int_0^2 \sqrt{4-x}\ dx$
2. (3pts) Find the geometric area of the following functions on the corresponding interval.
   (a) $f(x) = 6 - 3x^2$ on $[0, 2]$
   (b) $f(x) = 3x^2 - 3$ on $[0, 3]$
   (c) $f(x) = 9x^2 - 36$ on $[0, 4]$
3. (8pts) Compute the following integrals using integration by parts.
   (a) $\int \frac{\ln(x)}{x}\ dx$
   (b) $\int x^2 e^x\ dx$ (You will have to do the process twice in this example.)
   (c) $\int xe^{ax}\ dx$ for a real number a
   (d) $\int (\ln(x))^2\ dx$
4. (3pts) Find the (geometric) area between the following curves and the x-axis.
   (a) $f(x) = 27 - 3x^2$
   (b) $f(x) = 12 - \frac{3}{4}x^2$
   (c) $f(x) = -2x - \frac{x^2}{2}$
5. (3pts) Find the area of the region bounded by the two curves given.
   (a) $f(x) = \cos(x)$ and $g(x) = \sin(2x)$ on $[0, \frac{\pi}{2}]$ (Hint: $f(x) = g(x)$ when $x = \frac{\pi}{6}$.)
   (b) $f(x) = x^2 - 4x$ and $g(x) = 2x$
   (c) $f(x) = 7 - x^2$ and $g(x) = 2$