SKILLS CHECK 1
MATH 202 and MATH 202 Honors

This is a take home assignment. You may use your instructor to aid you in doing the following exercises. Any other help is expressly forbidden. The assignment is due on Monday, January 14 at 3:30 p.m. in Bancroft 158. **You must show your work to get credit. Please take care to make your work legible.**

1. (2 pts each) Find the derivative of the given functions.

   a) $f(x) = x^3\sqrt{16 - x^2}$

   b) $g(x) = \dfrac{x^3 + 2x - 4}{x^2 + 1}$

   c) $h(t) = (7t + 3)^5$

   d) $f(t) = t^3 \sin t$

   e) $h(t) = \dfrac{\ln t}{t^2}$

   f) $f(x) = \left(\dfrac{x^2}{x + 5}\right)^2$

   g) $g(x) = x^2 e^x$

   h) $f(x) = e^{x^4}$

   i) $f(\theta) = \theta \sin^{-1}(\theta^2)$

   j) $s(t) = \cos^2 5t$

2. (3 pts each) Find the following antiderivatives or definite integrals.

   a) $\displaystyle\int \left(\frac{1}{2x^3} + 4\sqrt{x}\right) dx$

   b) $\displaystyle\int 5e^{7x-1}\, dx$

   c) $\displaystyle\int \left(\frac{3}{4x} - \sec^2 x\right) dx$

   d) $\displaystyle\int 3 \sin 2x\, dx$

   e) $\displaystyle\int \left(\frac{1}{1 + x^2} + \frac{2}{\sqrt{1 - x^2}}\right) dx$

   f) $\displaystyle\int_0^1 (2x - 1)^4\, dx$

   g) $\displaystyle\int_{-5}^0 x\sqrt{4 - x}\, dx$

   h) $\displaystyle\int_0^{\sqrt{\pi}} x \sin x^2\, dx$

   i) $\displaystyle\int_e^{e^2} \frac{dx}{x \ln x}$

   j) $\displaystyle\int_0^{2/\sqrt{3}} \frac{1}{4 + 9x^2}\, dx$