Math 1720 Midterm 2 Review Problems

1. Compute
$$\frac{d}{dx}(\text{arcsec}(\ln(x))).$$

2. Find
$$\arctan(-1/\sqrt{3}).$$

Fully simplify the expression
$$\sec(\arctan(x)).$$
(Your answer should not involve any trig or inverse trig functions.)

Find
$$\int_{-\sqrt{3}}^{-\sqrt{2}} \frac{1}{\sqrt{4-x^2}}dx$$

3. Compute the limits
$$\lim_{x\to\infty}(1-3/x)^{2x}.$$
$$\lim_{x\to 0^+}\sin(x)^{\tan(x)}.$$

4. Compare the growth rates of the functions
$$f(x) = 2^x,$$
$$g(x) = \ln(5^x),$$
$$h(x) = x^{\ln(x)}.$$
Hint: for comparing f with h, convert to base e. Use the fact that if functions $k(x) \to \infty$ and $j(x) \to \infty$ as $x \to \infty$, and if $k(x) >> j(x)$, then $k(x) - j(x) \to \infty$ also.

5. Integrate
$$\int_0^1 x^2 2^x dx$$

Antidifferentiate
$$\int \sin(3x)\cos(x/2)dx.$$

Integrate
$$\int \ln(x)^2 dx$$
(Hint: note the integrand is not $\ln(x^2)$. Use a method like that used for antidifferentiating $\int \ln(x)dx$.)

6. Integrate

$$\int_0^{\pi/8} \sin^4(4x)\cos^2(4x)dx$$

Antidifferentiate

$$\int \sec^{-1/3}(x)\tan^3(x)dx$$

7. Antidifferentiate, simplifying fully.

$$\int (1-3x^2)^{3/2}dx$$

Integrate

$$\int_0^1 \frac{x^3}{1+x^2}dx.$$

Antidifferentiate:

$$\int \frac{x}{(x^2-2)^{25/2}}.$$