Rutgers University
Math 152

Calculus 1 Review Worksheet

1. Simplify the following expressions. Your answer should not involve any trigonometric or inverse trigonometric functions.

   (a) $\cos^{-1}\left(\frac{1}{2}\right)$

   (b) $\sin^{-1}\left(\sin(\frac{7\pi}{4})\right)$

   (c) $\cos(\sin^{-1}(x))$

   (d) $\sin(2\cos^{-1}(x))$

   (e) $\sec\left(\tan^{-1}\left(\frac{x}{3}\right)\right)$

   (f) $\sin\left(\cot^{-1}\left(\frac{2}{\sqrt{x}}\right)\right)$

2. Calculate the following limits.

   (a) $\lim_{x\to\infty} \dfrac{\ln(x)^2}{\sqrt{x}}$

   (b) $\lim_{x\to 0} \dfrac{5^x - 3^x}{\sin(2x)}$

   (c) $\lim_{x\to\infty} \tan^{-1}(x^2 - x^3)$

   (d) $\lim_{x\to\infty} \left(1 + \dfrac{2}{x}\right)^x$

   (e) $\lim_{x\to-\infty} \dfrac{2x + 3\cos(x)}{5x}$

   (f) $\lim_{x\to\infty} x^{1/x}$

3. Find the horizontal asymptotes of the following functions.

   (a) $f(x) = \dfrac{11x^3 + 2x - 1}{2x^3 - x^2 + 3}$

   (b) $f(x) = \dfrac{5x + \sqrt{16x^2 + 25}}{18x - 7}$

   (c) $f(x) = \dfrac{3e^{2x} - 2e^x + 4x^2}{x^2 - 6e^{2x}}$

4. Calculate the following indefinite or definite integrals.

   (a) $\displaystyle\int (3x+1)\left(x^2 - \frac{5}{x}\right)dx$

   (b) $\displaystyle\int x^3 \sin(x^4 + 2)dx$

   (c) $\displaystyle\int_0^1 \frac{x^3}{\sqrt{3 + x^2}}dx$

   (d) $\displaystyle\int t\sec^2\left(3t^2\right) e^{7\tan\left(3t^2\right)}dt$

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

   (f) $\displaystyle\int e^{2x}(e^x - 2)^{2/3}dx$

   (g) $\displaystyle\int_{e^3}^{e^6} \frac{dt}{t\ln(t)}$

   (h) $\displaystyle\int \frac{dx}{5x + 4\sqrt{x}}$

   (i) $\displaystyle\int \frac{dx}{\sqrt{2 - x^2}}$

   (j) $\displaystyle\int_0^1 \frac{xdx}{\sqrt{2 - x^2}}$

   (k) $\displaystyle\int_0^{2/3} \frac{dz}{4 + 9z^2}$

   (l) $\displaystyle\int \frac{dx}{x^2 + 6x + 34}$