Assignment #12 ***Math 180*** ***Name:***

1. Using Newton's method to approximate the following number:

   a) $\sqrt[5]{40}$

   b) $\sin\left(50^0\right)$

2. Using Newton's method to find all roots of the following equation correct to 5 decimal places:

a) $\tan^{-1} x = 1 - 2x$

b) $\sin x = x^2 - 2$

3. Find the most general anti-derivative of the following functions:

a) $f(x)=\left(3\sqrt{x}-2\sqrt[3]{x}\right)\left(2x+\sqrt{x}-3\right)$

b) $f(x)=\dfrac{5\sqrt{x}-3\sqrt[3]{x}+2}{15\sqrt[5]{x}}$

c) $f(x)=2e^{3x}+7\sin(14x)-2\sec^2(8x)+4$

d) $f(x)=\dfrac{5}{x^2+1}-\dfrac{3}{\sqrt{1-x^2}}+\tan^2(3x)$

2. Find a function $f(x)$ for the following functions:

a) $f''(x) = \sqrt[3]{x^2} - 2\sqrt{x} + 2;\ f(0) = 2;\ f'(1) = -2$

b) $f''(x) = 2\sin(2x) - 3\cos(x) + 2;\ f(\pi) = 1;\ f'\left(\frac{\pi}{2}\right) = 2$

3. A particle is moving with the following conditions. Find the position function of the particle.

$a(t) = 10\sin(t) + 3\cos(t);\ s(0) = 0;\ v(0) = 4$

4. a) A car braked with a constant deceleration of 16 ft/sec^2. Producing skid marks measuring 350ft before coming to a stop. How fast was the car traveling when the brakes were first applied?

b) A bus accelerates uniformly at 1.8 m/s^{2,} cruises at 12 m/s, and decelerates uniformly at 3 m/s^2 when braking. Calculate the trip time between two stops 500 m apart.

c) The driver of a fast car traveling on a narrow road at 40 m/s sees a slow bus 300 m ahead traveling at 10 m/s in the same direction. What constant – decelerate braking capability does the car need to avoid the collision if the bus continues with constant velocity?

d) You are driving along a highway at a steady 60 mph (88 ft/sec) when you see an accident ahead and slam on the breaks. What constant deceleration is required to stop your car in 242 ft?