Review Problems for Test II

Honors Calculus I, Fall 2002

1) Find the derivatives of the following functions:

1. $y = \frac{x + \sin x}{\cos x}$;

2. $g(\theta) = \frac{\tan\theta - 1}{\sec\theta}$;

3. $h(t) = \tan(\sin t + \cos t)$;

4. $f(t) = \sqrt[3]{1 + \tan t}$

2) Find all the points on the graph of $f(x) = 2\sin x + (\sin x)^2$, where the tangent line is horizontal.

3) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ by implicit differentiation:

1. $4\cos x \sin y = 1$;

2. $x^2 - xy^2 = 5y$

4) Find

1. $D^{100} \sin 2x$;

2. $D^n \left(\frac{1}{x}\right)$

5) A particle moves along a straight line with the displacement function $s(t) = 20\sin(5t + 3)$

1. find the velocity and acceleration of the particle;

2. find the acceleration after 1 second;

3. when is the speed maximal?

6) A ladder 10 ft long rests against a vertical wall. If the bottom of the ladder slides away from the wall at a speed 2 ft/sec, how fast is the angle between the top of the ladder and the wall changing when the angle is $\pi/4$ rad?

7) Use linear approximation to estimate $(2.01)^6$.