HW #2

① (a) $dy/dx = \cos x \quad y(0) = 0$, $dy = \cos x\, dx$

$y = \sin x + c$ $\quad \int_0^y dy = \int_0^x \cos x\, dx$

$0 = \sin(0) + c \quad c = 0$ $\quad \boxed{y = \sin x}$

(b)

x	y	ΔX
0	y_0	0.1
0.1	0.099	0.1
0.2	0.197	0.1
0.3	0.29	0.1
0.4	0.385	0.1

$dy = \cos(0)(0.1)$

$dy = 0.1$

$dy = \cos(0.1)(0.1)$

$dy = 0.099$

$dy = \cos(0.2)(0.1)$

$dy = 0.098$

$dy = \cos(0.3)(0.1)$

$dy = 0.0955$

(c) Excel

(d) Excel

② (a) $\frac{d^2y}{dx^2} = A\sin(x)\frac{dy}{dx} + B\cos x$

$h(x) = y'(x)$ $\quad \boxed{h(x) = y'(x) \text{ and } h'(x) = A\sin(x)\,h + B\cos(x)}$

$h'(x) = y''(x)$

with initial conditions

$h(0) = 0$ and $h'(0) = 0$