MATH1210: HOMEWORK SOLUTIONS §2.4

1. $\frac{dy}{dx} = 2\cos x - 3\sin x$

3. $\frac{dy}{dx} = \frac{d}{dx}[1] = 0$

5. $\frac{d}{dx}\left[\frac{1}{\cos x}\right] = \frac{+\sin x}{\cos^2 x}$

$= \sec x \tan x$

7. $\frac{d}{dx}[\tan x] = \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$

$= \frac{1}{\cos^2 x} = \sec^2 x$

9. $\frac{d}{dx}\left[\frac{\sin x + \cos x}{\cos x}\right] = \frac{d}{dx}[\tan x + 1]$

$= \sec^2 x$ (by #7)

11. $\frac{d}{dx}[\sin x \cos x] = \cos^2 x - \sin^2 x$

13. $\frac{d}{dx}\left[\frac{\sin x}{x}\right] = \frac{x\cos x - \sin x}{x^2}$

15. $\frac{d}{dx}[x^2 \cos x] = 2x\cos x - x^2 \sin x$

17. $\frac{d}{dx}[\tan x \cdot \tan x] = 2\tan x \sec^2 x$

21. $\frac{d}{dx}[\sin 2x] = \frac{d}{dx}[2\sin x \cos x]$

$= 2\cos^2 x + 2$

19. $\frac{d}{dx}[\cos x] = -\sin x$.

eq. of tan. at $x = 1$ is

$y - \cos 1 = -\sin 1(x - 1)$

27. tangent is horizontal when $f'(x) = 0$.

$f'(x) = 9\cos^2 x - 9\sin^2 x = 0$

$\Leftrightarrow \quad \cos^2 x = \sin^2 x$

$\Leftrightarrow \quad x = \frac{(2n+1)\pi}{4}, \quad n \in \mathbb{Z}$