1. $f(x) = 3x^2 - 2\cos x \quad \Rightarrow \quad f'(x) = 6x - 2(-\sin x) = 6x + 2\sin x$

2. $f(x) = \sqrt{x}\sin x \quad \Rightarrow \quad f'(x) = \sqrt{x}\cos x + \sin x\left(\frac{1}{2}x^{-1/2}\right) = \sqrt{x}\cos x + \dfrac{\sin x}{2\sqrt{x}}$

5. $g(t) = t^3\cos t \quad \Rightarrow \quad g'(t) = t^3(-\sin t) + (\cos t)\cdot 3t^2 = 3t^2\cos t - t^3\sin t$ or $t^2(3\cos t - t\sin t)$

8. $y = e^u(\cos u + cu) \quad \Rightarrow \quad y' = e^u(-\sin u + c) + (\cos u + cu)e^u = e^u(\cos u - \sin u + cu + c)$

10. $y = \dfrac{1+\sin x}{x+\cos x} \quad \Rightarrow$

$$y' = \frac{(x+\cos x)(\cos x) - (1+\sin x)(1-\sin x)}{(x+\cos x)^2} = \frac{x\cos x + \cos^2 x - (1-\sin^2 x)}{(x+\cos x)^2}$$
$$= \frac{x\cos x + \cos^2 x - (\cos^2 x)}{(x+\cos x)^2} = \frac{x\cos x}{(x+\cos x)^2}$$

13. $y = \dfrac{\sin x}{x^2} \quad \Rightarrow \quad y' = \dfrac{x^2\cos x - (\sin x)(2x)}{(x^2)^2} = \dfrac{x(x\cos x - 2\sin x)}{x^4} = \dfrac{x\cos x - 2\sin x}{x^3}$

22. $y = e^x\cos x \quad \Rightarrow \quad y' = e^x(-\sin x) + (\cos x)e^x = e^x(\cos x - \sin x) \quad \Rightarrow$ the slope of the tangent line at $(0,1)$ is $e^0(\cos 0 - \sin 0) = 1(1-0) = 1$ and an equation is $y - 1 = 1(x-0)$ or $y = x+1$.

33. $f(x) = x + 2\sin x$ has a horizontal tangent when $f'(x) = 0 \quad \Leftrightarrow \quad 1 + 2\cos x = 0 \quad \Leftrightarrow \quad \cos x = -\frac{1}{2} \quad \Leftrightarrow$ $x = \frac{2\pi}{3} + 2\pi n$ or $\frac{4\pi}{3} + 2\pi n$, where n is an integer. Note that $\frac{4\pi}{3}$ and $\frac{2\pi}{3}$ are $\pm\frac{\pi}{3}$ units from π. This allows us to write the solutions in the more compact equivalent form $(2n+1)\pi \pm \frac{\pi}{3}$, n an integer.