3.3

1. $\frac{d}{dx} f(x) = 3x^2 - 2\cos x$

$= 6x + 2\sin x$

2. $\frac{d}{dx} f(x) = \sqrt{x}\sin x$

$\cos x\sqrt{x} + \frac{1}{2}x^{-.5}\sin x$

3. $\frac{d}{dx} \sin x + \frac{1}{2}\cot x$

$\cos x + \frac{1}{2} - \csc^2 x$

4. $\frac{d}{dx}(2\sec x - \csc x)$

$2\sec(x)\tan(x) + \csc(x)\cot(x)$

5. $\frac{d}{d\theta} \sec\theta \cdot \tan\theta$

$= \sec^2\theta \cdot \sec\theta + \sec\theta \cdot \tan\theta \cdot \tan\theta$

6. $\frac{d}{d\theta} g(\theta) = (\sec^2\theta - 1)e^\theta + e^\theta(\tan\theta - \theta)$

7. $\frac{d}{dt} c\cos t + t^2\sin t = c(-c\sin t) + \cos t(t^2) + 2t(\sin t)$

8. $\frac{d}{dt} \frac{\cot t}{e^t} = \frac{\frac{d}{dt}\cot t \cdot e^t - e^t \cdot \cot t}{e^t} = -\csc^2 t - \cot t$

9. $\frac{d}{dx} \frac{x}{2-\tan x} = \frac{1(2-\tan x) - (0-\sec^2 x)\cdot x}{(2-\tan x)^2}$

10. $-\sin^2\theta + \cos^2\theta$

11. $\frac{(\sec\theta\cdot\tan\theta)(1+\sec\theta) - (\sec\theta\cdot\tan\theta)}{1+\sec\theta}$ $(\csc\theta)$

12. $\frac{(-\sin x)(1-\sin x) - (-\cos x)(\cos x)}{(1-\sin x)^2}$

13. $\frac{d}{dx} \frac{\cos x}{\sin x} = \frac{-\sin^2 x - \cos^2 x}{\sin^2 x} = \frac{-(1)}{\sin^2 x} = -\csc^2 x$

17. $\frac{d}{dx} \frac{1}{\sin x} = \frac{0\cdot\sin x - \cos x\cdot 1}{\sin^2 x}$

$= \frac{-\cos x}{\sin x}\cdot\frac{1}{\sin x}$

$= -\cot x \cdot \csc(x)$

25. $\frac{d}{dx}\ 2x\sin x = \cos x \cdot 2x + 2\sin x$

$2x\cdot\cos x + 2\sin x = \pi\cdot 0 + 2\cdot 1 = 2$

$y = (\pi - 2)x + 2$

$y - y_1 = m(x - x_1)$

$2\left(\frac{\pi}{2}\right) = \pi$

$y = 2x$

26. $y = 3 + 6\cdot -\sin x$

$y = 3 + 6\cdot -\sin\frac{\pi}{3}$

$3 - 3\sqrt{3}$

$y = (3 - 3\sqrt{3})x + 3 + \pi\sqrt{3}$

$\pi - \pi\sqrt{3}$

3-4

$\frac{d}{dx}(x^4+3x^2-2)^5 = 5(x^4+3x^2-2)\cdot(4x^3+6x)$

8. $100(4x-x^2)\cdot(4-2x)$

9. $\frac{1}{2}(\sqrt{1-2x})^{-.5}\cdot -2$

10. $\frac{(1+\sec x)^2 - (\sec x\tan x)\cdot 1}{(1+\sec x)^2}$

$\frac{d}{dx}(1+\sec x)^{-2} = -2(1+\sec x)^{-3}\cdot(0+\sec x\tan x)$

11. $\frac{d}{dz}(z^2+1)^{-1} = -1(z^2+1)^{-2}\cdot 2z$

12. $\frac{d}{dt}\sin(e^t)+e^{\sin t} = \cos(e^t)\cdot e^t + e^{\sin t}\cdot\cos t$

13. $y=\cos(a^3+x^3) = -\sin(a^3+x^3)\cdot(3a^2+3x^2)$

14. $3n^2 + 3\cos^2 x\cdot -\sin x$

15. $y = xe^{-kx} = e^{-kx}\cdot x + 1\cdot e^{-kx}$

16. $= (x+1)(e^{(-k+1)x})(-k)$

$= (-\sin 4t+1)(e^{-2t}) + (e^{-2t})(\cos 4t)$

17. $f(x) = (2x-3)^4 \cdot (x^2+x+1)^5$

$= 8(2x-3)^3(x^2+x+1)^5 + 5(2x-3)^4(2x+1)(x^2+x+1)^4$

$= (2x-3)^3(x^2+x+1)^4(28x^2-12x-7)$

18. $(x^2+1)^3(x^2+2)^6$

$6(x^2+2)(x^2+1)^3 \cdot 2x + 3(x^2+1)(x^2+4)^6 \cdot 2x$

19. $(t+1)^{\frac{2}{3}}(2t^2-1)^3 = 3(2t^2-1)(t+1)^{\frac{3}{3}}(4t) + \frac{2}{3}(t+1)$

20. $-3(2t^2-1)^{-4}(3t-1)^4(4t) + 4(3t-1)^3(2t^2-1)^{-3}(3)$ $(2t^2-1)(1)$

21. $((x^2+1)(x^2-1)^{-1})^{-3} = -3(x^2+1)(x^2-1)^{-1} \cdot -1(x^2-1)^{-2}(x^2+1)$

$4(2x)$

$+2x(x^2-1)^{-1}$

22. ~~$\sqrt{(x^2+1)}\sqrt{(5^2+4)}$~~

$\frac{1}{2}(x^2+1)^{-.5} \cdot \sqrt{5^2+4} \cdot 2x - \sqrt{x^2+1} \cdot \frac{1}{2}(x^2+4)^{-.5} \cdot x^3$

23. $\frac{d}{dx} 10^{1-x^2} = (1-x^2)10^{-x^2} \cdot -2x$

24. $\frac{d}{dx} 5^{-1/x} = -x^{-1} \cdot 5^{-x^{-1}-1} \cdot -1(x)^{-2}$

27. $\frac{r}{\sqrt{r^2+1}}$ $\sqrt{r^2+1} \to .5(r^2+1)^{-.5} \cdot 2r$ $\cdot r$

28. $\frac{e^v - e^{-v}}{e^v + e^{-v}}$ $(e^v - e^{-v})(e^v + e^{-v}) - (e^v + e^{-v})(e^v - e^{-v})$

$\cdot (e^x - e^{vx} \cdot -1)$ $(e^x + e^x \cdot -1)$

29. $e^{t + \sin 2t} = e^{t+\sin 2t} \cdot \frac{d}{dt}(t + \sin 2t)$

$= e^{t+\sin t} \cdot (t\cos 2t + \sin 2t)$

30. $\left(\frac{v}{v^3+1}\right)^6 = 6\left(\frac{v}{v^3+1}\right)^5 \cdot \frac{d}{dv}\left(\frac{v}{v^3+1}\right)$

$= 6\left(\frac{v}{v^3+1}\right)^5 \cdot \frac{v^3+1 - 3v^3}{(v^3+1)^2}$

31. $\cos(\tan 2t) \cdot \sec^2 2x \cdot 2$

51. $10(1+2t)^9 \cdot 2$

$20(1)^9 = 20$

$y = 20x + 1$

53 $.5(1+x^3)^{-.5} \cdot 3x^2$

$.5\left(\frac{1}{3}\right) \cdot 3 \cdot 2^2$

$= 2$

~~$y = x + 1$~~

$y = 2x - 1$

63. a. $5 \cdot 6 = 30$

b. $9.4 = 36$

65. how to find $f'(3)$?