1. $(f \circ g)(x) = \sqrt{3x+2}$ and dom $(f \circ g) = \left\{x \geq -\frac{2}{3}\right\}$ and $(g \circ f)(x) = 3\sqrt{x} + 2$ and dom $(g \circ f) = \{x \geq 0\}$

2. $(h \circ f)(x) = \dfrac{2\cos x}{1 + 2\cos x}$ and dom $(h \circ f) = \left\{x \neq \dfrac{2\pi}{3} + 2n\pi, \dfrac{4\pi}{3} + 2n\pi\right\}$ and $(f \circ h)(x) = \cos\left(\dfrac{2x}{1+2x}\right)$ and dom $(f \circ h)(x) = \left\{x \neq -\dfrac{1}{2}\right\}$

3. (a) 5, (b) 2, (c) 4, (d) 3, (e) 1, (f) 4

4. 5

5. The limit does not exist.

6. $\dfrac{3}{5}$

7. 32

8. $\dfrac{1}{2}$

9. -2

10. Use the Squeeze theorem and the fact that $-1 \leq \sin\left(\dfrac{42}{\sqrt[3]{x}}\right) \leq 1$

11. $a = 1$

12. $a = b = 4$

13. Using the defintion one gets $g'(x) = 2x + 2$.

14. Using the definition one gets $h'(t) = 3t^2 + 2$.

15. $f'(x) = 20x^4 + 28x^3 - 6x^2 + 20x + \pi$

16. $\dfrac{dy}{dt} = \dfrac{t^2 - 1}{(1 - t^2)^2} = \dfrac{1}{t^2 - 1}$

17. $u'(x) = 6x^2(x^4 - 2x) + (4x^3 - 2)(2x^3 + 3)$

18. $\dfrac{dh}{dw} = \dfrac{4w(w^5 - 2w + 6) - (5w^4 - 2)(2w^2 + 5)}{(w^5 - 2w + 6)^2}$

19. $\dfrac{dv}{ds} = \left(\dfrac{-8}{3s^5} - \dfrac{8}{s^3}\right)(s^2 + 3) + 2s\left(\dfrac{2}{3s^4} - \dfrac{4}{s^2 + 1}\right)$

20. $g'(x) = 1 - \dfrac{1}{x^2}$

21. $\dfrac{dw}{dy} = \dfrac{5\sqrt[7]{3}}{7} y^{-\frac{2}{7}} + \dfrac{21}{2} y^{\frac{5}{2}}$

22. $y = -3x + 2$

23. $y = \dfrac{3}{2}$

24. $y = -\dfrac{5}{9}x + \dfrac{16}{9}$

25. Pick $\delta = \dfrac{1}{5}$

26. $f'(0)$ does not exist because $\lim\limits_{x \to 0} \cos\left(\dfrac{1}{x}\right)$ does not exist.