1. $(f^{-1})'(1) = \dfrac{1}{2}$

2. $(f^{-1})'(2) = \dfrac{1}{3}$

3. $\dfrac{1}{3}e^3 - e + \dfrac{2}{3}$

4. $8 - \ln 3$

5. $2t \ln t + t$

6. $\dfrac{\ln 10}{2\sqrt{u}} 10^{\sqrt{u}}$

7. $5 \sec(5x)$

8. $3^{x \ln x} \ln 3 (\ln x + 1)$

9. $\tan^{-1} r + \dfrac{r}{1 + r^2}$

10. $-\dfrac{1}{x} - \dfrac{1}{x(\ln x)^2}$

11. ∞

12. π

13. 0

14. e^6

15. $\dfrac{7}{58} e^{3x} \sin(7x) + \dfrac{3}{58} \cos(7x) + C$

16. $-2t^2 e^{-t^2} + 2e^{-t^2} + C$

17. $\dfrac{1}{7}\sin^7 x - \dfrac{2}{3}\sin^9 x + \dfrac{15}{11}\sin^{11} x - \dfrac{20}{13}\sin^{13} x + \sin^{15} x - \dfrac{6}{17}\sin^{17} x + \dfrac{1}{19}\sin^{19} x + C$

18. $x \sec x - \ln|\sec x + \tan x| + C$

19. $\dfrac{\sqrt{1 - 9x^2}}{x} + C$

20. $-\ln\left(\dfrac{1}{\sqrt{2}} + 1\right)$

21. Draw two different right triangles

22. Use the Fundamental Theorem of Calculus on the first part. For the second part consider the limit as $x \to -1$