1. $-\frac{1}{5}\ln|x+4| + \frac{1}{5}\ln|x-1| + C$

2. $\frac{1}{2}x^2 + x + 5\ln|x-3| - 2\ln|x+2| + C$

3. $\frac{1}{x} - \ln|x+3| + C$

4. $e^x - \tan^{-1}(e^x) + C$

5. $\frac{1}{3}x\sin^3 x + \frac{1}{3}\cos x - \frac{1}{9}\cos^3 x + C$

6. $x - \ln|1+e^x| + C$

7. It converges by the Comparasion test, using the fact that $\tan^{-1} x \leq \pi/2$ on $[1,\infty)$. Note the exact answer can be computed but L'hopital's rule must be used.

8. diverges

9. $\frac{\pi}{2}$, so it converges.

10. $\ln|\sqrt{2}+1|$

11. $\frac{15}{2}$

12. $\frac{2}{27}(55\sqrt{55} - 37\sqrt{37})$

13. $\frac{\pi}{6}(5\sqrt{5} - 1)$

14. $\frac{\pi}{27}(1728 - 10\sqrt{10})$

15. $\frac{263\pi}{256}$

16. $(\overline{x}, \overline{y}) = \left(\frac{\pi}{2}, \frac{\pi}{8}\right)$

17. $(\overline{x}, \overline{y}) = \left(\frac{2}{5}, \frac{1}{5}\right)$

18. $\frac{dy}{dx} = \frac{2t + \cos t}{e^t}$

19. $L = \int_1^3 \sqrt{(e^t - e^{-t})^2 + \frac{4t^2}{(1+t^2)^2}}\, dt$

20. $\cot(2\theta) = \frac{3}{2}$

21. $r^2 = \ln(\cot\theta)$

22. $\theta = 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$

23. 1

24. ∞