Answers to Week 13 Week in Review

1.
   (a) $-2\ln|x| + \ln(x^2+1) + \arctan(x) + C$
   (b) $\ln(2+\sqrt{3}) - \ln(\sqrt{2}+1)$
   (c) $\frac{1}{2}\sin(2x) - \frac{1}{6}\sin^3(2x) + C$
   (d) $-\frac{1}{2}x\cos(2x) + \frac{1}{4}\sin(2x) + C$
   (e) $4 - 2\sqrt{2}$
2. $\ln(2) - \ln\left(\frac{1}{3}\right)$
3. $\frac{3}{2}\ln\left(\frac{\sqrt{3}}{2}\right) + \frac{1}{2}$
4. $V = \int_{-1}^{1} 2\pi(2-x)(1-x^2)\,dx$
5. 2π
6. $W = \int_{0}^{3} 16\rho g\sqrt{9-y^2}(y+1)\,dy$
7. $\sum_{n=0}^{\infty} \frac{(-1)^n 2^{n+1} x^{n+1}}{n+1}$
8. $\sum_{n=0}^{\infty} \frac{(-1)^n e^{-1}(x-1)^n}{n!}$
9.
   (a) Diverges by Limit Comparison Test with $\sum_{n=1}^{\infty} \frac{1}{n^{1/2}}$
   (b) Diverges by the Integral Test (or by Comparison Test with $\sum_{n=1}^{\infty} \frac{1}{n}$
10. ROC = 1; Interval $x \in (-1,\, 1]$
11. $T_3(x) = 1 + \frac{1}{2}(x-1) - \frac{1}{8}(x-1)^2$
12. $\frac{24}{5}$
13.