\[ x=0 \quad y=\frac{1}{x+1} \]

\[ x=2 \quad \text{Area} = \int_0^2 (\sqrt{x+2} - \frac{1}{x+1}) \, dx = \left[ \frac{2}{3} (x+2)^{\frac{3}{2}} - \ln(x+1) \right]_0^2 \]

\[ = \frac{16}{3} - \ln 3 - \left( \frac{2}{3} 2^{\frac{3}{2}} - 0 \right) \]

\[ = \frac{16}{3} - \ln 3 - \frac{4 \sqrt{2}}{3} \]

\[ e^\frac{\pi}{2} \approx 4.81. \]

\[ \text{Area} = \int_0^\frac{\pi}{2} (e^x - \sin x) \, dx = (e^x + \cos x) \bigg|_0^{\frac{\pi}{2}} \]

\[ = e^\frac{\pi}{2} + 0 - (1 + 1) = e^\frac{\pi}{2} - 2 \approx 2.81. \]

12. \[ x+y^2=2, \quad x+y=0 \]

\[ y = 2 - y^2, \quad x = -y. \]

\[ \text{Area} = \int_{-1}^2 [2-y^2 - (-y)] \, dy = \int_{-1}^2 (2-y^2+y) \, dy \]

\[ = \left[ 2y - \frac{y^3}{3} + \frac{y^2}{2} \right]_{-1}^{2} = 4 - \frac{8}{3} + 2 - (2 - \frac{1}{3} + \frac{1}{2}) = 8 - 3 - \frac{1}{2} = \frac{9}{2} \]

22. (a) The integral of the blue curve up to 2 is the distance travelled by A and the integral of the red curve is the distance travelled by B. Blue curve's integral up to 2 is smaller so A is ahead.

(b) The distance by which A is ahead.

(c) The shaded area looks larger than \( \int_1^2 (\text{blue-red}) \, dt \), so A is still ahead.

(d) Look for \( t \) so that \( \int_1^t (\text{blue-red}) \, dt \) approximately equals the shaded area. (e.g., \( t = 2.2 \)).