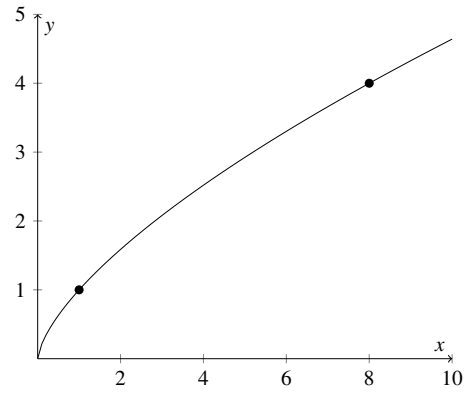
Kaleb Burris
MATH F252, Dr. J. Gimbel, University of Alaska Fairbanks
Homework Set V, Due Monday 6, 2023: §2.4 # 172, 174, 178

172. $y = x^{\frac{2}{3}} \quad (1,1) : (8,4)$



$$\text{Using} \quad \int_a^b \sqrt{1+f'(x)^2}\,dx$$

$$\Rightarrow \int_1^8 \sqrt{1+\left(\frac{2}{3}x^{-\frac{1}{3}}\right)^2}\,dx = \int_1^8 \sqrt{1+\frac{4}{9}x^{-\frac{2}{3}}}\,dx$$

Using computer approximation: $\approx \boxed{7.6337}$

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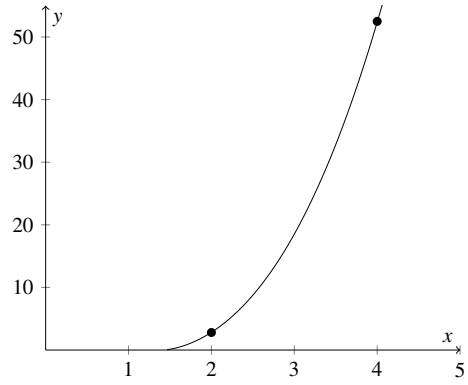
174. $\frac{1}{3}(x^2-2)^{\frac{3}{2}} \quad 2:4$



$$\text{Using} \quad \int_a^b \sqrt{1+f'(x)^2}\,dx$$

$$\Rightarrow \int_2^4 \sqrt{1+\left(3x\sqrt{x^2-2}\right)^2}\,dx = \int_2^4 \sqrt{1+(9x^2(x^2-2))}\,dx$$

$$= \int_2^4 \sqrt{1+9x^4-18x^2}\,dx \approx \boxed{49.605}$$

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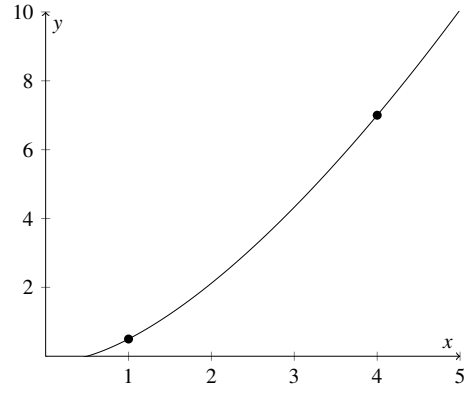
178. $\frac{6x^{\frac{3}{2}}-3x^{\frac{1}{2}}}{6} \quad 1:4$



$$\text{Using} \quad \int_a^b \sqrt{1+f'(x)^2}\,dx$$

$$\Rightarrow \int_1^4 \sqrt{1+\left(\frac{6x^{\frac{3}{2}}-x^{\frac{1}{2}}}{4}\right)^2}\,dx$$

$$= \int_1^4 \sqrt{1+\frac{36x^3-x^2+x}{8}}\,dx \approx \boxed{26.4585}$$