

Lesson 6.5.1

6-164. The area is growing as the right bound approaches 8. This could be represented as $\lim_{b \rightarrow 8} \int_1^b f(x) dx$. The end result should be the full area under the curve for $1 \leq x \leq 8$.

6-165. Most students will tell you that the area must be infinite. This will be further explored in problem 6-166.

6-166. See below:

- When $F(b) - F(a)$ is evaluated, $\ln|0|$ does not exist. Therefore the expression cannot be evaluated.
- The total area of $\int_0^2 \frac{1}{x} dx$.
- ∞ ; yes

6-167. See below:

- Type I, $\lim_{b \rightarrow \infty} \int_1^b \frac{1}{x^2} dx$
- Type II, $\lim_{b \rightarrow 2} \int_b^6 \frac{1}{\sqrt{x-2}} dx$
- Type II, $\lim_{b \rightarrow 1} \left[\int_0^b \frac{1}{x^2-2x+1} dx + \int_b^2 \frac{1}{x^2-2x+1} dx \right]$
- Type I, $\lim_{b \rightarrow -\infty} \int_b^0 e^x dx$



6-168. See below:

- Type I, 1
- Type II, ∞

c. Type I, ∞

6-169. See below:

a. 2

b. DNE

c. $4 \ln 2$

d. $\frac{1}{x}$

e. 0

f. 0

g. 1

6-170. ≈ 1.35914

6-171. inc. on $[-0.5, \infty)$, dec. on $(-\infty, -0.5]$, CU on $(-\infty, 0]$ and $[1, \infty)$, CD on $[0, 1]$, absolute min at $f(-0.5) \approx -1.191$, points of inflection at $(0, 0)$ and $(1, 3)$, vertical tangent at $x = 0$, x -intercepts at $x = 0$ and $x = -2$, y -intercept at $(0, 0)$.

6-172. See below:

a. $v(t) = 5 \cos\left(\frac{\pi}{5}t\right) + 1$

b. 5 ft

6-173. See below:

a. $2x \cos(e^{x^2})$

b. 0

c. -10

6-174. See below:

a. $\frac{-\sin x}{2\sqrt{\cos x}}$

b. $\left(\frac{-2x}{(1+x^2)^2} \right) e^{1/(1+x^2)}$

c. $\frac{\cos^{-1} x + \sin^{-1} x}{\sqrt{1-x^2} (\cos^{-1} x)^2}$

$$\text{d. } -\frac{1}{3} \left(\frac{x^3}{x^2+5} \right)^{-4/3} \left(\frac{x^4+15x^2}{x^4+10x^2+25} \right)$$

$$\text{e. } (x-3)^{-1/2}(x+1)^2(3.5x-8.5)$$