Can You Go the Distance? (Lecture Assignment)

Complete this assignment and submit it to Gradescope by 4:00pm on your class day. You can print this sheet, or write on your own paper. Contact us if internet connections or other issues require alternate arrangements.

1. Compute $\int_1^4 x - \frac{1}{x}\,dx$.

$\int_1^4 x\,dx - \int_1^4 \frac{1}{x}\,dx = \left[\frac{x^2}{2}\right]_1^4 - \left[\ln(|x|)\right]_1^4 = 8 - \frac{1}{2} - \left(\ln(4) - \ln(1)\right) = \frac{15}{2} - \left(\ln(2^2) - \ln(2^0)\right) = \frac{15}{2} - 2\ln(2)$

2. An abandoned disposable mask[1] floats through the Mississippi River. The velocity of the mask at time t is given by $v(t) = t^2 + 2t - 3$.

   (a) Find the *net distance* traveled by the mask from $t = 0$ to $t = 3$.

$\int_0^3 (t^2+2t-3)\,dx = \left[\frac{t^3}{3} + t^2 - 3t\right]_0^3 = \frac{27}{3} + 3^2 - 3\cdot 3 - (0) =$

$9 + 9 - 9 = 9$

   (b) Find the *total distance* traveled by the mask from $t = 0$ to $t = 3$

$\int_0^3 |t^2+2t-3|\,dx = \int_0^1 (-t^2-2t+3)\,dx + \int_1^3 (t^2+2t-3)\,dx =$

$\left[-\frac{t^3}{3} - t^2 + 3t\right]_0^1 + \left[\frac{t^3}{3} + t^2 - 3t\right]_1^3 =$

$\frac{5}{3} + \frac{32}{3} = \frac{37}{3}$

One-Minute Questions: Write a sentence for each.

A. What's one mathematical question you have after watching the videos?

Nothing as of right now.

B. What's one interesting thing you learned from the book or videos?

I thought it was interesting how $\int f'(x)\,dx = f(x) + C$.

[1] Please note that we are not condoning throwing used masks anywhere but the trashcan! ☺