SOLUTIONS FOR HOMEWORK PROBLEMS 16.8

MATH 132 - WI00

4

When you are given some fixed x-s then they will definitely be limit values for your integral; hence for our problem we'll have, being given $x = 2$ and $x = 4$: $\int_2^4 x + 5\,dx = \frac{x^2}{2} + 5x|_2^4 = (\frac{4^2}{2} + 5 * 4) - (\frac{2^2}{2} + 5 * 2) = 28 - 12 = 16$

•

8

Same trick here, $x = -2$ and $x = -1$, so: $\int_{-2}^{-1} 2x^2 - x\,dx = 2\frac{x^3}{3} - \frac{x^2}{2}|_{-2}^{-1} = (2\frac{(-1)^3}{3} - \frac{(-1)^2}{2}) - (2\frac{(-2)^3}{3} - \frac{(-2)^2}{2}) = (2\frac{-1}{3} - \frac{1}{2}) - (2\frac{-8}{3} - \frac{4}{2}) = -\frac{7}{6} - (-\frac{44}{6}) = \frac{37}{6}$

The reason I went into that much depth into computing the result is that I want to make sure you notice and remember that: " **Negative** numbers raised to **odd** powers remain **negative**, but the same **negative** numbers raised to **even** powers become **positive** " !! So a negative number will give up its negative sign when it has a even power (2, 4, 6, etc).

•

20

Notice that e^2 is a constant ... I know you know, but just wanted to make sure :).

$\int_1^{e^2} \frac{1}{x}\,dx = \ln x|_1^{e^2} = \ln(e^2) - \ln(1) = \ln(e^2) - \ln(e^0) = 2 - 0 = 2$

•

28

The "absolute value" function has a change in 0; the very first thing you have to check is whether 0 is between the integral limits, namely -2 and 2 $\rightarrow$ it is! so then you have to compute the area as an integral on [-2, 0] using one formula, and on [0,2] using another formula for $|x|$. What are these formulas? $|x|$ equals $-x$ on [-2,0] (since x is negative there) and it equals x on [0,2] (since x is positive now).

$$\int_{-2}^{0} |x|\,dx = \int_{-2}^{0} -x\,dx = -\frac{x^2}{2}|_{-2}^{0} = (-\frac{0^2}{2}) - (-\frac{(-2)^2}{2}) = (-\frac{0}{2}) - (-\frac{4}{2}) = 2$$

$$\int_0^2 |x|\,dx = \int_0^2 x\,dx = \frac{x^2}{2}|_0^2 = \frac{4}{2} = 2.$$

The area is then equal to 2+2=4

•

Date: 03/10/2000.