Calculus AB

4-4

(Day 1)

Fundamental Theorem of Calculus

The Fundamental Theorem of Calculus -

If a function *f* is continuous on the closed interval [a,b] and *F* is an antiderivative of *f* on the interval [a,b], then

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Evaluate each definite integral. (pg 293)

8) $\int_2^5 (-3v+4)\,dv$ $= -\frac{3}{2}v^2 + 4v \Big|_2^5 =$

$= \left[-\frac{3}{2}(5)^2 + 4(5)\right] - \left[-\frac{3}{2}(2)^2 + 4(2)\right]$ (F(b) − F(a))

$= -\frac{75}{2} + 20 + \frac{12}{2} - 8 = -\frac{63}{2} + \frac{24}{2} = \boxed{-\frac{39}{2}}$

Evaluate each definite integral.

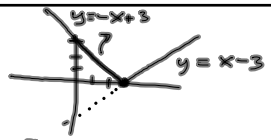
18) $\int_1^8 \sqrt{\frac{2}{x}}\,dx = \int_1^8 \sqrt{2}\,x^{-\frac{1}{2}} = 2\sqrt{2}\,x^{\frac{1}{2}}\Big|_1^8$

$2\sqrt{2}\,(8)^{\frac{1}{2}} - 2\sqrt{2}\,(1)^{\frac{1}{2}}$

$8 - 2\sqrt{2}$

Evaluate each definite integral.

*) $\int_0^5 |x-3|\,dx$



$\int_0^3 (-x+3)\,dx + \int_3^5 (x-3)\,dx$

$-\frac{1}{2}x^2 + 3x\Big|_0^3 + \frac{1}{2}x^2 - 3x\Big|_3^5$

$\left(\left[-\frac{1}{2}(3)^2 + 3(3)\right] - \left[-\frac{1}{2}(0)^2 + 3(0)\right]\right) + \left(\left[\frac{1}{2}(5)^2 - 3(5)\right] - \left[\frac{1}{2}(3)^2 - 3(3)\right]\right)$

$\left(\frac{9}{2} - 0\right) + \left(-\frac{5}{2} - \frac{9}{2}\right) = \boxed{-\frac{5}{2}}$

Evaluate each definite integral.

34) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (2t + \cos t)\,dt = t^2 + \sin t \Big|_{-\frac{\pi}{2}}^{\frac{\pi}{2}}$

$= \left[\left(\frac{\pi}{2}\right)^2 + \sin\frac{\pi}{2}\right] - \left[\left(-\frac{\pi}{2}\right)^2 + \sin\left(-\frac{\pi}{2}\right)\right]$ ($\sin\frac{\pi}{2} = 1$, $\sin\left(-\frac{\pi}{2}\right) = -1$)

$1 + 1$

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Assignment:
pg 293
5-31 odd