Panel 1

Computer Assign: posted, due with final exam

Dec. 12 @ 8 am

Final: Dec 16 @ 10:10 am

Final focuses on integration, but includes old stuff

Need: Course evaluation!!!

Panel 2

Review: (indefinite integral)

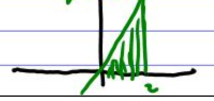
$$\int f(x)\,dx = \text{antideriv. of } f$$

(definite integral)

$$\int_a^b f(x)\,dx = \text{area under curve, if } f \geq 0$$

Ex: $\int 3x^4 + \frac{1}{x} - \sqrt{x}\,dx = 3\frac{1}{5}x^5 + \ln(x) - \frac{2}{3}x^{3/2} + C$ ($\sqrt{x} = x^{1/2}$)

$$\int_0^2 4x\,dx = \frac{1}{2}2\cdot 8 = \underline{8}$$



$\frac{1}{2}5\cdot 4$

Panel 3

v = velocity

Let $v(x) = \cos(x) + e^x$, $s(0) = 5$, find distance $s(x)$

$\Rightarrow s(x) = \int \cos(x) + e^x \, dx = \sin(x) + e^x + C$

$s(0) = 5 = \sin(0) + e^0 + C$

$5 = 1 + C \Rightarrow \underline{C = 4}$

$\cancel{\int x}$

$\int 5x \, dx = 5 \frac{1}{2} x^2 + C$

$\cancel{5x\,dx}$

Panel 4

Last Quiz

Name: __________

(1) Find the following antiderivatives:

a) $\int 3x^2 + \sqrt[3]{x} - \frac{3}{x^5} \, dx$

b) $\int 5e^x - \frac{1}{x} + \sin(x) + \frac{3}{1+x^2} \, dx$

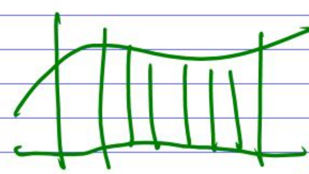
Panel 5

(2) Find $\int_0^2 3x\,dx$ geometrically by interpreting the integral as area under a curve.

(3) If $v(t) = 2t+3$ is the speed of a particle, find the distance function $s(t)$, where $s(0) = 10$

Panel 6

Thm: If f is continuous except for finitely many jump discontinuities, then f is integrable



too complex

$\lim_{n\to\infty} \frac{1}{n}\left(f(x_1)+\dots+f(x_n)\right)$

$\int_a^5 f(x)\,dx$ exists

(net) area under curve (too limiting)

Panel 7

(Int. evaluation thm)

Big-Deal Theorem: Fundamental Thm of Calc

If f is integrable on $[a,b]$ (e.g. continuous)

then $\int_a^b f(x)dx = F(x)\Big|_a^b = F(b) - F(a)$

F is antiderivative.

Ex: $\int_0^1 x^2 dx = \frac{1}{3}x^3\Big|_0^1 = \frac{1}{3}1^3 - 0 = \underline{\underline{1/3}}$.

$\int_1^2 x^4 dx = \frac{1}{5}x^5\Big|_1^2 = \underline{\underline{\frac{1}{5}2^5 - \frac{1}{5}1^5}} =$

Panel 8

Evaluate the following definite integrals:

a) $\int_0^2 6x^2 - 4x\, dx = 2x^3 - 2x^2\Big|_0^2 = (2\cdot 2^3 - 2\cdot 2^2) - 0$

b) $\int_1^e 5 + \frac{1}{x}\, dx = 5x + \ln(x)\Big|_1^e = 5e + \ln(e) - 5 + \ln(1)$
$= 5e + 1 - 5 = 1$

c) $\int_{-\pi/4}^{\pi/4} \sin(x)\, dx = -\cos(x)\Big|_{-\pi/4}^{\pi/4} = -\cos(\frac{\pi}{4}) - (-\cos(-\frac{\pi}{4}))$

d) $\int_{-1}^{1} \frac{1}{1+x^2} dx = \tan^{-1}(x)\Big|_{-1}^{1}$

Panel 9

Properties of the Integral

(1) $\int_a^b c\,dx = cx\Big|_a^b = cb - ca = c(b-a)$

(2) $\int_a^b f(x)+g(x)\,dx =$

(3) $\int_a^b c\cdot f(x)\,dx =$

(4) $\int_a^c f(x)\,dx + \int_c^b f(x)\,dx = \int_a^b f(x)\,dx$

(5) If $f(x) \geq g(x)$ then

(6) If $m \leq f(x) \leq M$ then

If f is cont. on $[a,b]$ then f is

Theorem

Panel 10

Fundamental Thm of Calc (1)

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

Ex: $\int_1^2 3x^2 - \frac{1}{x}\,dx$

Fund. Thm. of Calc (2): If f is cont. on $[a,b]$ and define $F(x) =$ next time

Then: