February 7
Review for Test

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$$\int \frac{t+1}{\sqrt{t}}\,dt = \int\left(\frac{t}{\sqrt{t}}+\frac{1}{\sqrt{t}}\right)dt = \int\left(t^{1/2}+t^{-1/2}\right)dt = \left(\frac{2}{3}\right)t^{3/2}+\left(\frac{2}{1}\right)t^{1/2}+C$$

$$=\frac{2}{3}t^{3/2}+2t^{1/2}+C$$

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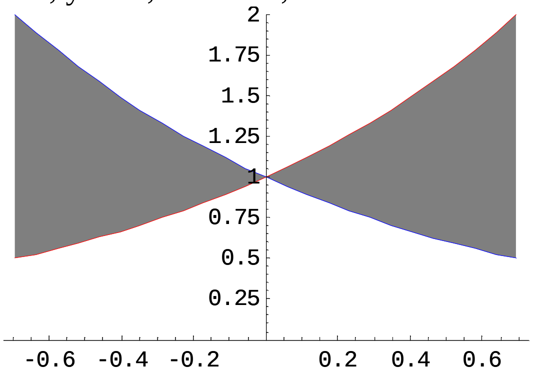
$y = e^{|x|}$, $y = 0$, $x = -1$, $x = 2$
If $-1 < x < 0$, $y = e^{|x|} = e^{-x}$; also, if $0 < x < 2$, $y = e^{|x|} = e^{x}$
This is more difficult than what would be on the test

Page 469, Problem #29
$y = e^{x}$, $y = e^{-x}$, $x = -\ln 2$, and $x = \ln 2$



The blue curve is $y = e^{-x}$; the red curve is $y = e^{x}$. These curves intersect at $x = 0$

$$\int_{-\ln 2}^{0}\left(e^{-x}-e^{x}\right)dx+\int_{0}^{\ln 2}\left(e^{x}-e^{-x}\right)dx = \left[-e^{-x}-e^{x}\right]_{-\ln 2}^{0}+\left[e^{x}+e^{-x}\right]_{0}^{\ln 2}$$

$$=\left[-e^{-0}-e^{0}\right]-\left[-e^{-(-\ln 2)}-e^{-\ln 2}\right]+\left[e^{\ln 2}+e^{-\ln 2}\right]-\left[e^{0}+e^{-0}\right]$$

$$=-1-1-\left[-2-\frac{1}{2}\right]+\left[2+\frac{1}{2}\right]-[1+1]=-2+2+\frac{1}{2}+\frac{5}{2}-2=1$$

$$e^{-\ln 2}=e^{\ln 2^{-1}}=2^{-1}=\frac{1}{2};\; e^{\ln 2}=2$$

Rule

$$\int e^{ax}\,dx=\frac{1}{a}e^{ax}+C$$

Example:

$$\int\left(\frac{x}{4}-\frac{4}{x}\right)dx=\int\left(\frac{1}{4}x-4\frac{1}{x}\right)dx=\frac{1}{4}\left(\frac{1}{2}\right)x^{2}-4\ln|x|+C=\frac{1}{8}x^{2}-4\ln|x|+C$$

$$=\frac{1}{8}x^{2}-\ln x^{4}+C$$

$$\ln\left(a^{b}\right)=b\ln a$$

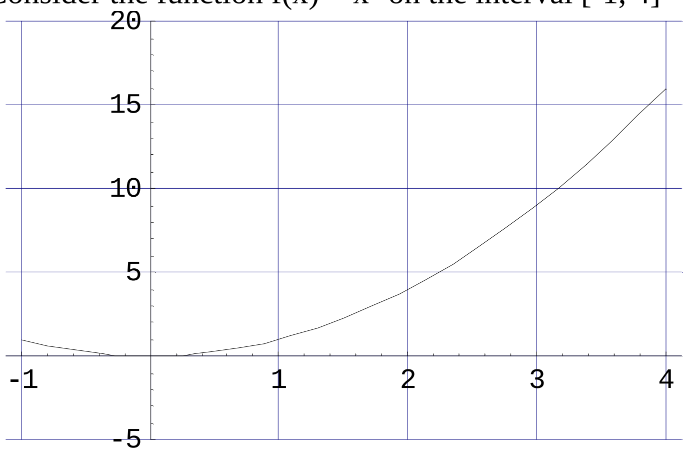
Practice Exam #1b

Differentiate y = $\ln(3x^2 + e^{5x})$

$$\frac{dy}{dx} = \frac{6x + 5e^{5x}}{3x^2 + e^{5x}}$$

$$y = \ln u; \frac{dy}{dx} = \frac{du/dx}{u}$$

Example:
Consider the function $f(x) = x^2$ on the interval [-1, 4]



Let's use right-hand intervals and n = 5

Interval	right-hand endpoint	height of rectangle	width of rect.	area
1	0	0^2	1	0
2	1	1^2	1	1
3	2	4	1	4
4	3	9	1	9
5	4	16	1	16

Approximation = 0 + 1 + 4 + 9 + 16 = 30

If the interval is [a, b], the width is (b – a)/n