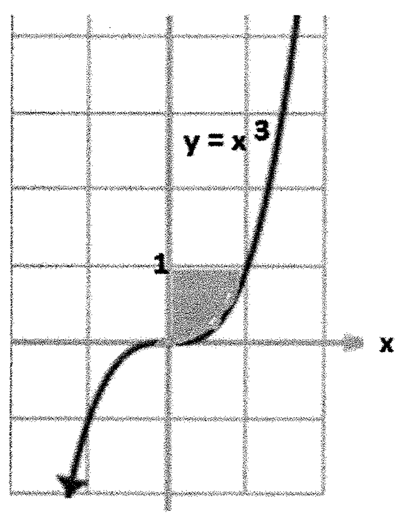
Math 132, Spring 2017
Quiz 1, January 31, 2017
For all 8 a.m. Sections
Show enough work to make it clear how you got your answer.
Do NOT use any methods except those discussed so far in this course.

1. Find $\int \frac{x}{\sqrt{1+2x^2}}\, dx$ $= \int \frac{1}{4} \frac{1}{\sqrt{u}}\, du$

Let $u = 1+2x^2$
$du = 4x\,dx$
$\frac{1}{4} du = x\,dx$

$= \frac{1}{4}(2u^{1/2}) + C = \frac{1}{2}\sqrt{1+2x^2} + C$

2. Find the shaded area:



$A = \int_0^1 1 - x^3\, dx$

$= x - \frac{x^4}{4}\Big|_0^1 = (1-\frac{1}{4}) - (0-0)$

$= 3/4$

$\left(\underline{or} \quad \int_0^1 (y^{1/3} - 0)\, dy = \frac{3}{4} y^{4/3}\Big|_0^1 = 3/4\right)$

Math 132, Spring 2017
Quiz 1, January 31, 2017
For all 9 a.m. Sections
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1. Find $\int \cos x \sec^2(\sin x)\, dx$

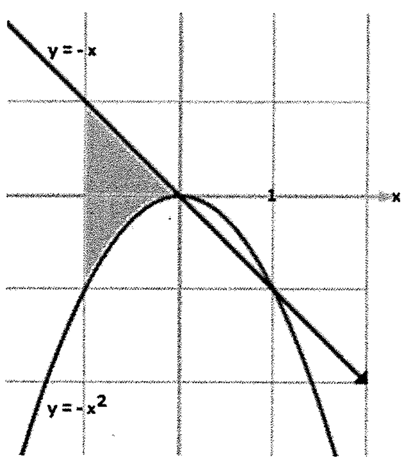
$= \int \sec^2 u \, du$

Let $u = \sin x$
$du = \cos x \, dx$

$= \tan u + C$

$= \tan(\sin(x)) + C$

2. Find the shaded area:



$A = \int_{-1}^{0} -x - (-x^2)\, dx$

$= \int_{-1}^{0} x^2 - x\, dx$ $\quad 0 - \left(\frac{1}{2} - \frac{1}{3}\right)$

$= \frac{x^3}{3} - \frac{x^2}{2}\Big|_{-1}^{0} = 0 - \left(-\frac{1}{3} - \frac{1}{2}\right)$

$= \frac{5}{6}$

(or (harder):

$A = \int_{-1}^{0} -\sqrt{-y} + 1\, dy + \int_{0}^{1} -y + 1\, dy$

$= \dots = 5/6$)

Math 132, Spring 2017
Quiz 1, January 31, 2017
For all 10 a.m. Sections
Show enough work to make it clear how you got your answer.
Do NOT use any methods except those discussed so far in this course.

1. When you substitute $u = \tan x$ into the integral $\int_0^{\pi/4} \frac{\sec^2 x}{2+\tan^2 x}\,dx$, what is the new definite integral that you get? You do **not** need to evaluate the new integral! *Your answer should look like $\int_c^d h(u)\,du$, where you have put in the correct values for c, d and the correct function h(u).*

Let $u = \tan x$

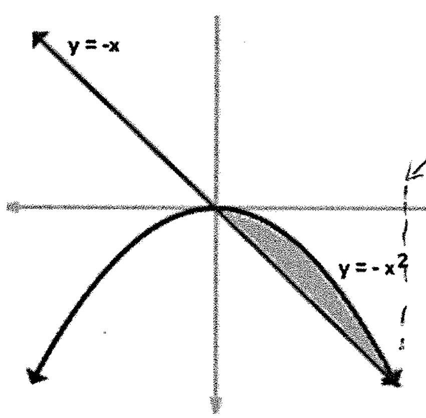
$du = \sec^2 x\,dx$

$x = 0 \to u = \tan 0 = 0$

$x = \frac{\pi}{4} \to u = \tan\frac{\pi}{4} = 1$

$= \int_0^1 \frac{1}{2+u^2}\,du$

2. Find the shaded area:



The curves intersect where

$-x = -x^2$

$x^2 - x = 0$

$x(x-1) = 0$

$x = 0,\ x = 1$

$A = \int_0^1 -x^2 - (-x)\,dx$

$= \int_0^1 x - x^2\,dx = \frac{x^2}{2} - \frac{x^3}{3}\Big|_0^1 = \frac{1}{6}$

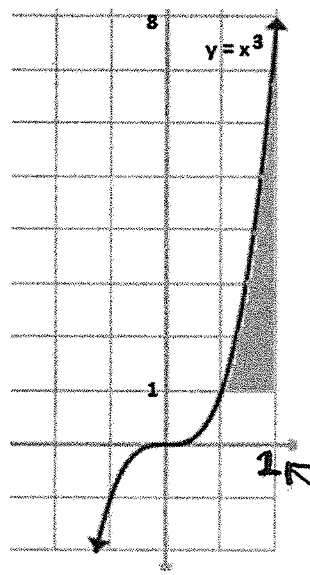
[or, harder:

$A = \int_{-1}^0 \sqrt{-y} + y\,dy$

$= \ldots = 1/6$]

Math 132, Spring 2017
Quiz 1, January 31, 2017
For all 11 a.m. Sections
Show enough work to make it clear how you got your answer.
<u>Do NOT use any methods except those discussed so far in this course.</u>

1. Find the shaded area:



$y=8 \Rightarrow x=2$

$$A = \int_1^2 x^3 - 1\, dx = \left.\frac{x^4}{4} - x\right|_1^2$$
$$= (4-2) - \left(\frac{1}{4} - 1\right)$$
$$= 2 - (-3/4)$$
$$= 11/4$$

$$\left(\text{or: } A = \int_1^8 2 - \sqrt[3]{y}\, dy = 11/4\right)$$

2. If you substitute $u = \ln t$ into the integral $\int_1^e \frac{\cos(\ln t)}{t(t+1)}\, dt$, what is the new definite integral that you get? You do **<u>not</u>** need to evaluate the new integral! *Your answer should look like $\int_c^d h(u)\, du$, where you have put in the correct values for c, d and the correct function $h(u)$*

$u = \ln t \qquad t = e^u$

$du = \frac{1}{t}\, dt \qquad t+1 = e^u + 1$

$$\int_1^e \frac{\cos \ln t}{t(t+1)}\, dt = \int_0^1 \frac{\cos u}{e^u + 1}\, du$$

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For all 12 p.m. Sections
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<u>Do NOT use any methods except those discussed so far in this course.</u>

1. Find $\int \frac{3x}{x^2+4}\,dx$

Let $u = x^2+4$

$du = 2x\,dx$

$\frac{3}{2}du = 3x\,dx$

$$= \int \frac{3}{2}\cdot\frac{1}{u}\,du$$

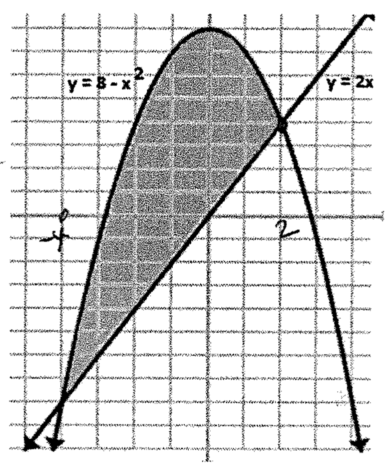
$$= \frac{3}{2}\ln|u| + C$$

$$= \frac{3}{2}\ln|x^2+4| + C$$

$$= \frac{3}{2}\ln(x^2+4) + C$$

since $x^2+4 > 0$

2. Find the shaded area:



The curves intersect where

$8 - x^2 = 2x$

$x^2 + 2x - 8 = 0$

$(x+4)(x-2) = 0$

$x = -4, 2$

$$A = \int_{-4}^{2} (8-x^2) - 2x\,dx = \int_{-4}^{2} 8 - 2x - x^2\,dx$$

$$= 8x - x^2 - \frac{x^3}{3}\Big]_{-4}^{2} = \left(16 - 4 - \tfrac{8}{3}\right) - \left(-32 - 16 + \tfrac{64}{3}\right)$$

$$= 60 - \frac{72}{3} = 60 - 24 = 36$$