Exam *should* be out of 60. With a generous curve, it's out of 80.

Name
Exam 4 :: Math 271 :: April 26, 2017

INSTRUCTIONS: Choose any seven of the eight problems.

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1. Ryan fires a projectile from the ground (height 0) upward at an initial velocity of 480 $\frac{ft}{s}$. Assuming the effect of air resistance is negligible and the effect of gravity is $-32\frac{ft}{sec}$. Answer the following questions.

$v(0) = 480$, $a(t) = -32$

$v(t) = \int a(t)\,dt = \int -32\,dt = -32t + C$

$= -32(0) + 480$

$v(0)$

$\boxed{v(t) = -32t + 480}$

from the ground: $s(0) = 0$, $C = 0$

$s(t) = \int v(t)\,dt = \int -32t + 480\,dt = \frac{-32t^2}{2} + 480t + C$

$\boxed{s(t) = -16t^2 + 480t}$

When does the projectile strike the ground? $s(t) = 0$

Solve $s(t) = 0$

$-16t^2 + 480t = 0$

$t^2 - 30t = 0$

$t(t-30) = 0$

$\boxed{t = 0}$

$\boxed{t = 30}$

With what speed does the projectile strike the ground?

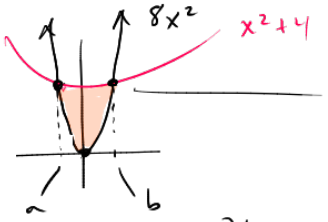
$v(30) = -32(30) + 480 = \boxed{-480}$

2. Find the average velocity of a projectile whose velocity in $(\frac{ft}{sec})$ is given by $v(t) = t^3$ where t is measured in seconds and $t \in [0, 5]$.

Avg Value $\quad \frac{1}{b-a}\int_a^b f(t)\,dt$

Avg Velocity $= \frac{1}{5-0}\int_0^5 t^3\,dt = \frac{1}{4}\cdot\frac{1}{5}t^4 = \frac{1}{20}t^4\Big|_0^5 = \frac{5^4}{20} \approx 31.1$

3. Find the area bound by $y = 8x^2$ and $y = x^2 + 4$. Sketch the region.



set $8x^2 = x^2 + 4$

$7x^2 = 4$

$x^2 = \frac{4}{7} = \pm\frac{2}{\sqrt{7}}$

$\int_a^b x^2+4-8x^2\,dx = \int_{-\frac{2}{\sqrt{7}}}^{2/\sqrt{7}} 4-7x^2\,dx = 4x - \frac{7x^3}{3}\Big|_{-\frac{2}{\sqrt{7}}}^{\frac{2}{\sqrt{7}}}$

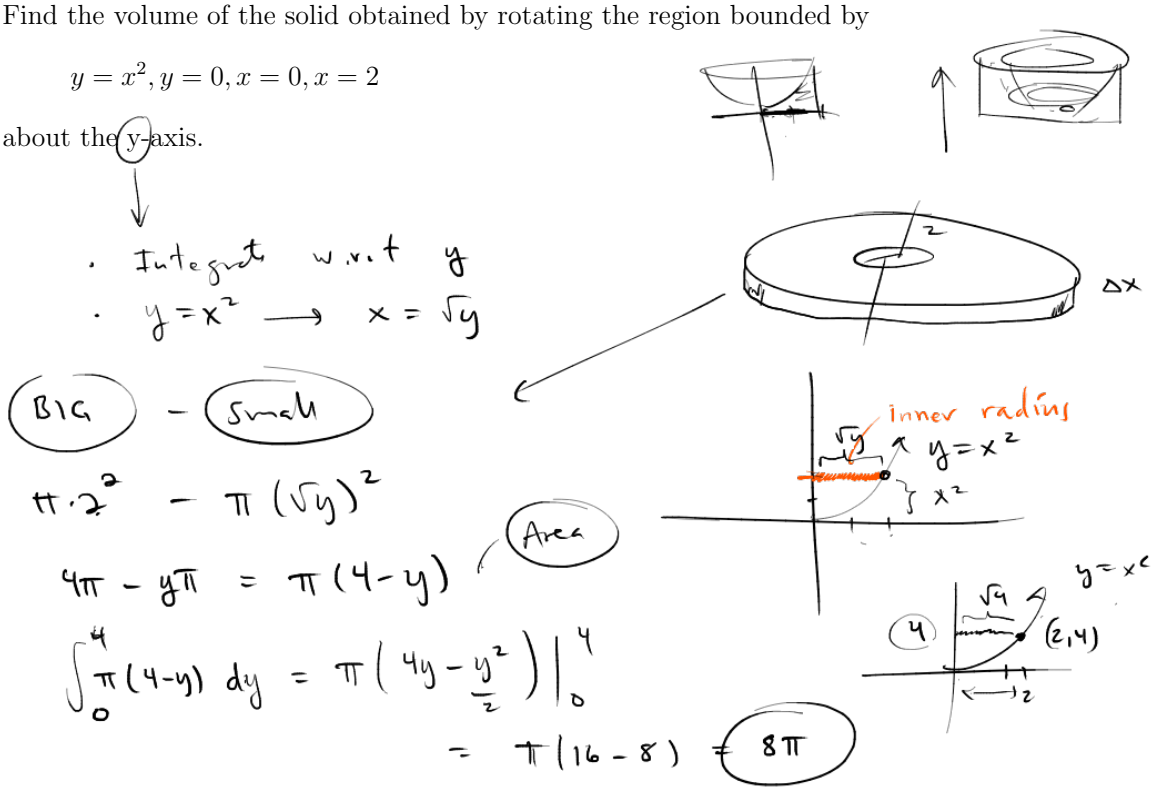
Even. $4-7x^2 \Rightarrow$ double $2\left(4x - \frac{7x^3}{3}\right)\Big|_0^{\frac{2}{\sqrt{7}}} = 2\left(4\left(\frac{2}{\sqrt{7}}\right) - \frac{7\left(\frac{2}{\sqrt{7}}\right)^3}{3}\right)$

area ω right $= 4.01$

4. Find the volume of the solid obtained by rotating the region bounded by

$$y = x^2, y = 0, x = 0, x = 2$$

about the y-axis.



5. Find the volume of the solid obtained by rotating the region bounded by

$$y = x^2, y = 0, x = 0, x = 2$$

about the x-axis.