Math 141  
Quiz 3  
February 1, 2016  

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10:10 class  
SECTION 1

**SET UP** the definite integral(s) to find the volume of the solid generated by rotating the region bounded by the graphs of \( y = 2x - x^2 \), \( y = x \) about the x-axis using **vertical rectangles**.

**WASHER**

\[
R(x) = 2x - x^2  \\
\text{r}(x) = x  \\
\lim_{x \to \text{limits}}:  \\
2x - x^2 = x  \\
x^2 - x = 0  \\
x(x - 1) = 0  \\
x = 0, 1
\]

\[
V = \pi \int_0^1 [(2x - x^2)^2 - (x)^2] \, dx
\]

**SET UP** the definite integral(s) to find the volume of the solid generated by revolving the region bounded by the graphs of and \( x = y^2 \) and \( x = y + 2 \) about the line \( y = 2 \), using **horizontal rectangles**.

**SHELL**

\[
h(y) = y^2 - y^2  \\
p(y) = 2 - y  \\
\lim_{y \to \text{limits}}: y^2 - y^2 = 0  \\
y^2 - y - 2 = 0  \\
(y - 2)(y + 1) = 0  \\
y = 2, -1
\]

\[
V = 2\pi \int_{-1}^{2} [(2 - y)(y^2 + 2 - y^2)] \, dy
\]
**SET UP** the definite integral(s) to find the volume of the solid if the region bounded by \( y = x - 1 \) and \( y = x^2 - 2x + 1 \) are rotated about the line \( x = 2 \) using vertical rectangles.

Shell

\[
p(x) = 2 - x \\
h(x) = (x - 1) - (x^2 - 2x + 1) \\
\text{limits:} \\
x^2 - 2x + 1 = x - 1 \\
x^2 - 3x + 2 = 0 \\
(x - 2)(x - 1) = 0 \\
x = 2, 1
\]

\[
V = 2\pi \int_1^2 (2-x) \left[ (x-1) - (x^2 - 2x + 1) \right] \, dx
\]

**SET UP** the integral to find the volume of the solid generated by rotating the region bounded by the graphs of \( y = \sqrt{x-2}, x = 1, y = 0, \) and \( y = 3 \) about the \( y \)-axis using horizontal rectangles.

**WASHER**

\[
R(y) = y^2 + 2 \\
L(y) = 1 \\
V = \pi \int_0^3 (y^2 + 2)^2 - (1)^2 \, dy
\]