TEST 1 PRACTICE PROBLEMS
CALCULUS II (MATH 152)
SPRING 2013

(1) Evaluate
   (a) $\int \theta \sec^2(3\theta^2) d\theta$
   (b) $\int \frac{x^2}{\sqrt{x^3+4}} dx$
   (c) $\int \frac{\cos(z)}{(1+\sin(z))^3} dz$
   (d) $\int \frac{\cos(z)}{1+\sin(z)} dx$
   (e) $\int_0^1 \frac{1}{9+x^2} dx$
(2) Find the average value of each of the following functions over the specified interval:
   (a) $f(x) = \sqrt{5x-1}$ over $[1,2]$.
   (b) $g(x) = \cos(x)e^{\sin(x)}$ over $[2,3]$.
(3) For each of the following problems, find the area bounded by the given curves/regions.
   (a) $y = x^3 - 6x^2 + 8x$ and $y = 0$.
   (b) $y = e^{2x}$, $y = -e^x$, $x = -2$ and $x = 5$.
   (c) $x = y^2$, $x = 2$.
   (d) $x = y^2$, $x = 2$, $y \geq 0$.
   (e) $x = y^2$, $x = 2$, $y \geq -1$.
   (f) $x = y^2 + 1$ and $x = -y^2 + 3$.
(4) For each of the following problems **set up, but do not evaluate the integral** for the volume of the solid generated by rotating the region bounded by the given curves/regions about the specified axis of rotation using the **Washer/Disk Method**.
   (a) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: x-axis.
   (b) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $y = -2$.
   (c) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $y = 1$.
   (d) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $y = 3$.
   (e) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $y = 5$.
   (f) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: y-axis.

(g) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $x = -5$.
(h) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $x = 5$.

(5) For each of the following problems **set up, but do not evaluate the integral** for the volume of the solid generated by rotating the region bounded by the given curves/regions about the specified axis of rotation using the **(Cylindrical) Shell Method**.
(a) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: x-axis.
(b) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $y = -2$.
(c) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $y = 1$.
(d) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $y = 3$.
(e) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $y = 5$.
(f) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: y-axis.
(g) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $x = -5$.
(h) Region: $y = x^2 + 1$, $y = 3$, $x \geq 0$; Axis of Rotation: $x = 5$.

(6) For each of the following problems find the volume of the solid generated by rotating the region bounded by the given curves/regions about the specified axis of rotation using **any method**.
(a) Region: $y = 4 - 3x$, $y = 3$, $y = 0$, $x = 0$; Axis of Rotation: y-axis.
(b) Region: $y = 4 - 3x$, $y = 3$, $y = 0$, $x = 0$; Axis of Rotation: x-axis.
(c) Region: $y = \sqrt{2 - x}$, $x = -2$, $y = 0$; Axis of Rotation: $y = -3$.
(d) Region: $y = 1/x^2$, $y = 2$, $x = 2$; Axis of Rotation: x-axis.
(e) Region: $y = 1/x^2$, $y = 2$, $x = 2$; Axis of Rotation: y-axis.
(f) Region: $y = 1/x^2$, $y = 2$, $x = 2$; Axis of Rotation: $x = -5$.

(7) Find the length of the given curve over the specified interval.
(a) $y = 2x^{3/2} + 1$ from $x = 0$ to $x = 1$.
(b) $x = \frac{1}{3}(y^2 + 2)^{3/2}$ from $y = 0$ to $y = 1$.
(c) $y^2 = x^3$ from $x = 2$ to $x = 7$.

(8) Find the area of the surface generated by revolving of the given curve about the x-axis.
(a) $y = 5x$ from $x = 0$ to $x = 1$.
(b) $y = \sqrt{9 - x^2}$ from $x = 0$ to $x = 1$.

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