Worksheet 13

Fall 2016

MATH 221, Week 13 (14?)

Name: _____

1 Integration

(a) Compute $\int_0^1 \sqrt{1-x^2}\,dx$ using areas.

(b) Find the area bounded by $y = x^2 - 2$ and $y = x + 3$. Be sure to show all of your work.

(c) Find the area bounded by $x = (y-2)^2$ and $y = x$. Not a typo.

(d) Compute the following definite integral

$$\int_0^1 2x \sec^2(x^2)\,dx$$

(e) Find

$$\int \frac{x}{x+1}\,dx$$

This is an important trick!

2 Mixed Bag

(a) Find the following limit $\lim_{\theta \to 0} \frac{2}{\theta \tan(\theta)} - \frac{2}{\theta \sin(\theta)}$.

(b) Compute $\int_0^{100} \frac{1}{x^2+1}\, dx$. What happens when you replace 100 with N? Where does this function of N go if you let $N \to \infty$?

(c) Compute $\lim_{x \to \infty} \sqrt{x^2 + x} - x$.

(d) Compute $\lim_{x \to 4} \frac{x-4}{\sqrt{x}-2}$.

(e) Find the limit $\lim_{x \to -\infty} \frac{x^2+2x-1}{5-x^2}$.

3 A Taste of Rotation of Solids

(a) Compute the volume when the area described in problem 1(c) is rotated about $y = -1$.

(b) Compute the volume of the solid obtained by rotating the triangle with vertices $(2, 2), (2, 3)$ and $(3, 3)$ around the x-axis. What does this look like?