**MTH 252: Spring 2017**

**Week 4 Worksheet**

**Do all the problems without using a calculator. You must show all the steps.**

**1.**

**a.** Find the points of intersection for two curves $y = -x$ and $y = 2 - x^2$. Between the points of intersection, which one of the two curves is above the other?

**b.** Find the points of intersection for two curves $y = \dfrac{4}{1+x^2}$ and $y = 1$. Between the points of intersection, which one of the two curves is above the other?

**c.** Find the points of intersection for two curves $y = \sqrt{x+1}$ and $y = \dfrac{1}{x+1}$. For $x$ to the right of the intersection point, which of the two curves is above the other?

**2.** Let $f(x) = \sqrt{x}$ and $g(x) = x^4$. We have that $f(x) \geq g(x)$ over $[0, 1]$.

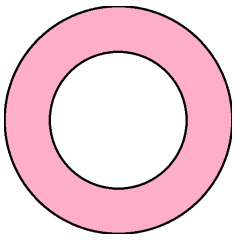
**a.** Compute the area below the graph of $f(x)$ over $[0, 1]$.

**b.** Compute the area below the graph of $g(x)$ over $[0, 1]$.

**c.** Using the answers from **a** and **b**, compute the area of the region between $f(x)$ and $g(x)$ (the part below $f(x)$ and above $g(x)$) over $[0, 1]$.

**d.** In general, if $f(x) \geq g(x)$ over $[a, b]$, express the area between the two curves over $[a, b]$ as a single definite integral.

**3.** Suppose that we have two concentric circles where the radius of the larger circle is given by $f(x)$ and the radius of the smaller by $g(x)$. Compute the area of the region between the two circles. (The shaded region in the figure below.)



**4.** Suppose that we have a hollow cylinder without the top or bottom whose height is given by the function $f(r)$ where $r$ is the radius. If we cut open the cylinder and flatten out as a rectangle as shown in the figure below, what is the area of the rectangle?