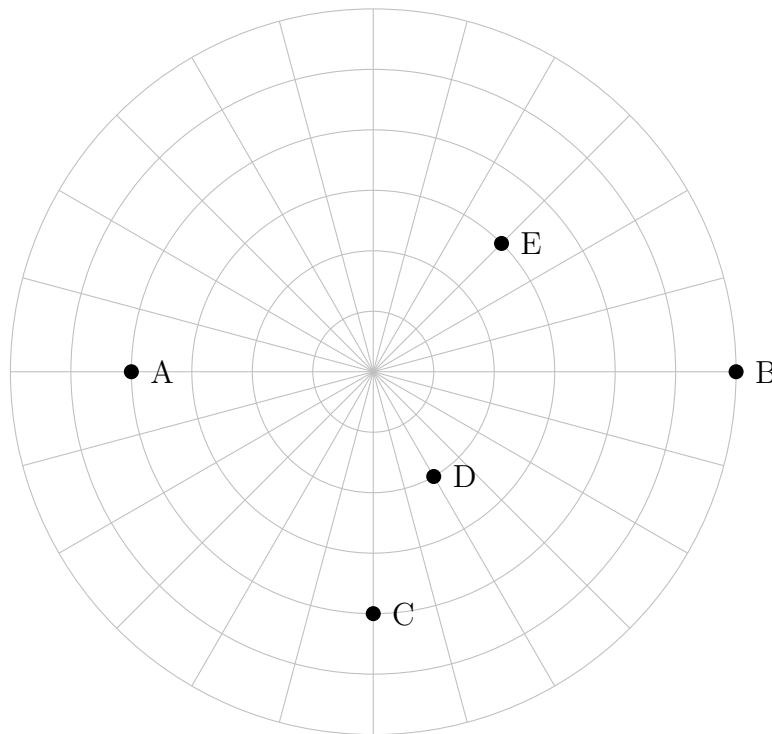# Math 1520 – Quiz 5 – Take Home

   This quiz should take you approximately 25 minutes. You may use your book, calculators, software, the internet, and any reference material, but do not work together and do not get help (except from Dr. Clair). Show work on all problems.

(10)   1. Plot and label these points, which are given in polar coordinates (r, θ).

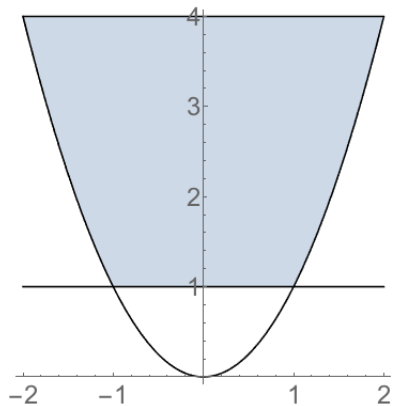   A. $(4, \pi)$ B. $(6, 0)$ C. $(-4, \pi/2)$ D. $(2, -\frac{\pi}{3})$ E. $(3, \frac{\pi}{4})$

(10)   2. Find the length of the curve $y = \sin(x)$ from $x = 0$ to $x = \pi$. Give an approximate answer to at least two decimal places.

Solution:
$$\int_0^\pi \sqrt{1 + \cos^2(x)}\,dx \approx 3.82$$

(10) 3. The region shown below is bounded by $y = x^2$, $y = 1$, and $y = 4$. Find its area exactly.
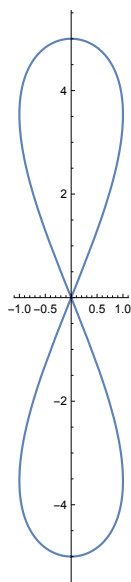

Solution: Slice horizontally intro strips of height Δy and width $2\sqrt{y}$. The area is

$$\int_1^4 2\sqrt{y}\,dy = \tfrac{4}{3}y^{3/2}\big|_1^4 = \tfrac{4}{3}(8-1) = \tfrac{28}{3}$$

(10) 4. Make an accurate sketch of the parametric curve

$$x = 2\sin(t)\cos(t),\, y = 5\cos(t),\quad t \in [-\pi, \pi]$$

Solution:

(10) 5. The region bounded by $y = x^{1/4}$, $x = 9$, and the x axis is revolved around the x axis to form a solid. Find the exact volume of that solid.

Solution: Slice the region into disks with width Δx and radius $x^{1/4}$. Then the volume is

$$\int_0^9 \pi \left(x^{1/4} \right)^2 dx = \pi \cdot \tfrac{2}{3} x^{3/2} \Big|_0^9 = 18\pi$$