

**Multiple choice problems for sections 11.3, 11.4**

*MATH 104.*

Credit is given only if you choose the correct answer *and* show supporting work.

1. Find the length of the spiral

$$r = 2\theta$$

for the values  $0 \leq \theta \leq 4\pi$ .

A.)  $4\pi\sqrt{16\pi^2 + 1} + \ln(4\pi + \sqrt{16\pi^2 + 1})$

B.)  $\arctan 2 + \frac{2\pi+1}{\pi-1}$

C.)  $\frac{\sqrt{5}}{2}(e^{4\pi} - 1)$

D.)  $12\pi$

E.)  $24\pi$

F.)  $24$

2. Sketch the curve with equation in polar coordinates,

$$r = 1 + 2 \sin \theta.$$

The curve self-intersects at the origin, and consists of a smaller loop inside a larger loop. Find the area of the region inside the smaller loop of the curve.

- A.)  $\frac{1}{2}$    B.)  $\pi - 3$    C.)  $2\pi - 4\sqrt{2}$    D.)  $\frac{\pi}{6}$    E.)  $\pi - \frac{3}{2}\sqrt{3}$    F.)  $\frac{\pi}{4}$

3. Find the area of the region that is inside *both* of the following curves,

$$r = \cos \theta.$$

$$r = \sin \theta + \cos \theta.$$

- A.)  $\frac{5\pi}{16} - \frac{1}{8}$    B.)  $\frac{5\pi}{8} - \frac{1}{4}$    C.)  $\frac{\pi}{4} - \frac{1}{4}$    D.)  $\frac{\pi}{2} - \frac{1}{2}$    E.)  $\frac{1}{2}$    F.)  $\frac{2}{3}$