

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

1. The gamma function is defined as $\Gamma(x) = \int_0^{\infty} t^{x-1} e^{-t} dt$.

a) Find $\Gamma(1)$, $\Gamma(2)$, $\Gamma(3)$, $\Gamma(4)$, and $\Gamma(5)$. Is there a pattern?

b) Show that $\Gamma(x + 1) = x \Gamma(x)$ for all $x > 0$. [Hint: Integration by Parts is your friend.]

2. a) Use *Mathematica* or other technology to find an exact value for $\Gamma(1/2)$.

b) Explain how, once you have the value from part a for $\Gamma(1/2)$, you can find $\Gamma(3/2)$ and $\Gamma(-1/2)$ without needing a computer or calculator again.

