

9. [12 points] It turns out that students at Alex and Chris' university have a strong tradition of taking university math classes. In fact, Chris determines that for the function  $p(t) = \frac{1}{5(\frac{1}{5}+t)^2}$ , the fraction of students having completed between  $t$  and  $t + \Delta t$  years of collegiate mathematics is given approximately by  $p(t) \Delta t$ .
- (a) [4 points of 12] Carefully find the fraction of students who have completed at least two years of university mathematics.
- (b) [4 points of 12] Let  $q(x)$  be the fraction of students that complete no more than  $x$  years of university mathematics. Write an integral that gives  $q(x)$ . Then evaluate your integral to find a formula for  $q(x)$ .
- (c) [4 points of 12] We might think that the integral  $\int_0^\infty t p(t) dt$  would give the average number of years of university mathematics that the students take. Explain why this does not make sense in this context. (Hint: how large is this value?)