

7. [6 points] A new edition of an old video game features a rocket which blasts off into space along a straight-line path. As in the earlier edition of the video game, at  $t = 10$  seconds after the rocket engines ignite, the rocket detaches from the platform and lifts off. The game designers slightly altered the speed function in the new edition to

$$r(t) = \frac{1}{t^{4/5}(1 + t^{2/5})} \text{ km/second,}$$

where  $t$  is measured in seconds after the engines ignite so the formula for  $r(t)$  given above is valid for  $t \geq 10$ .

- a. Assuming time in the video game goes on forever, write an expression involving an integral that represents the distance from the launchpad that the rocket approaches as time goes on.

**Answer:** \_\_\_\_\_

- b. Determine whether the answer to part a. converges or diverges.

- If the integral converges, circle “Converges”, find its exact value, and write the exact value on the answer blank provided.
- If the integral diverges, circle “Diverges” and carefully justify your answer.

In either case, you must show all your work and use proper notation. Evaluation of integrals must be done **without using a calculator**.

Hint: let  $w = t^{1/5}$ .

Circle one: **Converges to** \_\_\_\_\_ or **Diverges**