7. [8 points] Suppose $p(t) = t^{\sqrt{1/(t+1)}}$ gives the position of an object moving along a straight line, in meters east of a fixed starting point, t seconds after it begins moving. Note that the derivative $p'(t)$ outputs both positive and negative values for t-values in the interval $[0, 20]$. Match each expression on the right below with the letter (a) – (e) that it represents, or else write (f) if it does not represent any of (a) – (e). *Note: each letter (a) – (f) may appear more than once, or not at all.*

(a) the object's instantaneous velocity at $t = 20$

(b) the object's average velocity over the time interval $[0, 20]$

(c) the amount of time it takes for the object to travel 20 meters

(d) the total distance the object traveled over the time interval $[0, 20]$

(e) the distance between the object's location at $t = 0$ and its location at $t = 20$

(f) none of (a) – (e)

i. (b) $\dfrac{20^{\sqrt{1/21}} - 0^{\sqrt{1/1}}}{20 - 0}$

ii. (f) $\displaystyle\int_0^{20} t^{\sqrt{1/(t+1)}}\, dt$

iii. (f) $\dfrac{(20+h)^{\sqrt{1/(21+h)}} - 20^{\sqrt{1/21}}}{h}$

iv. (e) $\displaystyle\int_0^{20} p'(t)\, dt$

v. (d) $\displaystyle\int_0^{20} |p'(t)|\, dt$

vi. (a) $\displaystyle\lim_{h \to 0} \frac{(20+h)^{\sqrt{1/(21+h)}} - 20^{\sqrt{1/21}}}{h}$

vii. (f) $\dfrac{t^{\sqrt{1/21}} - 20^{\sqrt{1/21}}}{t - 20}$

viii. (e) $20^{\sqrt{1/21}} - 0^{\sqrt{1/1}}$