Math 45, Fall 2020
September 23, Quiz 04 Name: _____

Please show and explain your work where necessary. Good luck!!

1. (*7 points*) Consider the differential equation $y' = y\sqrt{y-x}$.

(i) For what (x, y) is it guaranteed that the differential equation above has a unique solution?

(ii) In the xy-plane, graph the region of such (x, y) found in (i).

(iii) Is it guaranteed that the differential equation above have a unique solution at the point $(1, 0)$?

(iv) Same problem as in (iii) but for $(0, 1)$?

(v) Same problem as in (iii) but for $(1, 1)$?

2. (*3 points*) Circle all of the following differential equations which are separable equations.

(i) $\dfrac{dy}{dx} = x^2y^3$

(ii) $\dfrac{dy}{dx} = \ln(xy)$

(iii) $w\dfrac{dw}{dt} = 10 + t$

(iv) $\sqrt{y'} + xy = 0$

(v) $y' + xy + x = 0$

(vi) $xy\dfrac{dy}{dx} + 1 = 0$