

MATHEMATICS 2 - MAKEUP TEST SPECIMEN

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| NAME: | SIGNATURE: |
| DATE: |            |

**Total credit:**

## Justify your answers!

1. Write the rational function  $f(x) = \frac{3x^2 + 2x}{x + 1}$  as a sum of a polynomial and a rational function whose numerator is of lower degree than the denominator. *Credit:*

2. Find a primitive function to the function  $f(x) = \frac{3x - 2}{x^2}$ . *Credit:*

3. Calculate  $\int \sqrt{2x + 5} \, dx$ . *Credit:*

4. Calculate the area of the plane figure bounded by the curves given:  $y = 4 - x^2$ ,  $y = 0$ . *Credit:*

5. Compute the volume of the solid of revolution formed by rotating of a plane figure bounded by the following curves:  $y = 0$ ,  $x = 4$ ,  $y = 2\sqrt{x}$ , rotating is about the  $x$ -axis. *Credit:*

6. Sketch the domain of the function  $f(x, y) = \sqrt{x - 1} + \sqrt{y + 2}$ . *Credit:*

7. Calculate  $\frac{\partial f(x, y)}{\partial y}$  for the function  $f(x, y) = (x^2 + y)e^{-xy}$ . *Credit:*

8. Decide which one of the expressions  $\frac{-y^2 dx - 2xy dy}{\sin^2(xy^2)}$ ,  $\frac{y^2 dx + 2xy dy}{\sin^2(xy^2)}$ ,  $\frac{dx + dy}{\sin^2(xy^2)}$  is a total differential of the function  $f(x, y) = \cotg(xy^2)$ . Justify your answer. *Credit:*

9. Decide which one of the curves  $x + 7y - 8 = 0$ ,  $7x - y - 6 = 0$ ,  $x + y - 2 = 0$ ,  $x - y = 0$  is a tangent to the curve  $x^2 - 2xy + y^2 + 5x - 5y = 0$  at the point  $[1, 1]$ . Justify your answer. *Credit:*

10. Find the stationary points of the function  $f(x, y) = 2\ln(x - 1) - \ln(2 - y) - x - y - 3$  if they exist. *Credit:*