

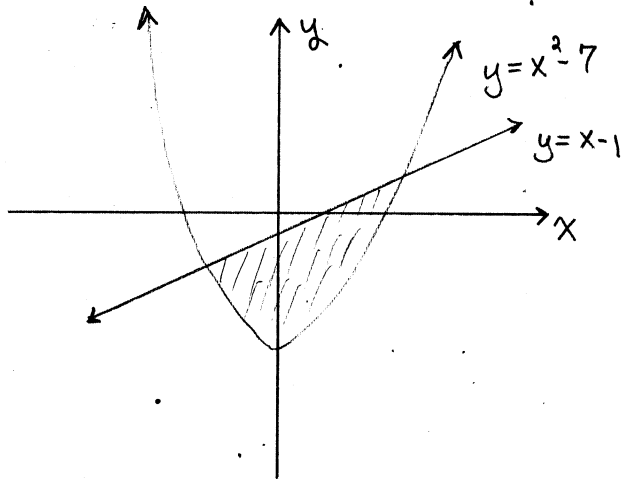
Math 132 - Quiz 1 (IC)

August 24, 2022

Name key
Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) Find the area of the bounded region between the graphs of $y = x^2 - 7$ and $y = x - 1$.



$$x^2 - 7 = x - 1$$

$$\Rightarrow x^2 - x - 6 = 0$$

$$(x - 3)(x + 2) = 0$$

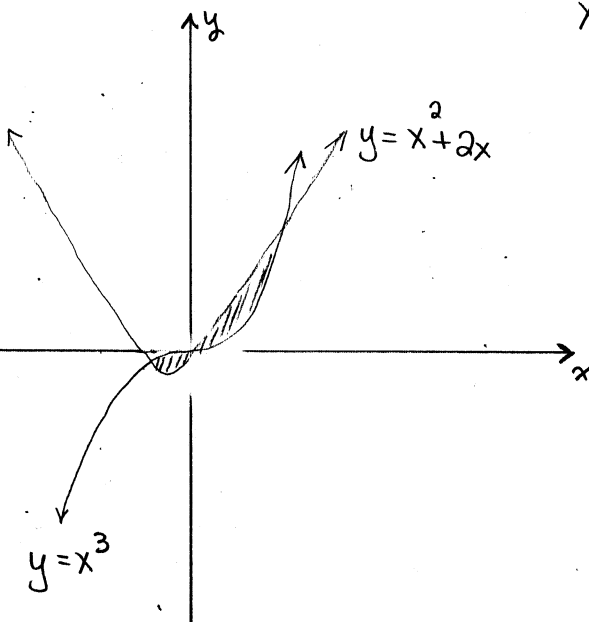
$$x = 3, x = -2$$

$$\int_{-2}^3 [(x - 1) - (x^2 - 7)] dx = \int_{-2}^3 (6 + x - x^2) dx$$

$$= \left[6x + \frac{1}{2}x^2 - \frac{1}{3}x^3 \right]_{-2}^3$$

$$= \frac{27}{2} - \left(-\frac{22}{3} \right) = \boxed{\frac{125}{6}}$$

2. (3 points) Find the total (combined) area of the bounded regions between the graphs of $y = x^3$ and $y = x^2 + 2x$.
(Helpful info: The equation $x^3 = x^2 + 2x$ has solutions $x = -1, x = 0, x = 2$.)



$$x^3 = x^2 + 2x \Rightarrow x = -1, x = 0, x = 2$$

$$\int_{-1}^0 (x^3 - x^2 - 2x) dx + \int_0^2 (x^2 + 2x - x^3) dx$$

$$= \left[\frac{1}{4}x^4 - \frac{1}{3}x^3 - x^2 \right]_{-1}^0 + \left[\frac{1}{3}x^3 + x^2 - \frac{1}{4}x^4 \right]_0^2$$

$$= 0 - \left(-\frac{5}{12} \right) + \frac{8}{3} - 0$$

$$= \boxed{\frac{37}{12}}$$

Math 132 - Quiz 1 (TH)

August 24, 2022

Name key
Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due August 29.

1. (2 points) For review, evaluate the indefinite integral: $\int 7x^2 \sin(x^3) dx$

$$u = x^3$$

$$du = 3x^2 dx$$

$$\frac{1}{3} du = x^2 dx$$

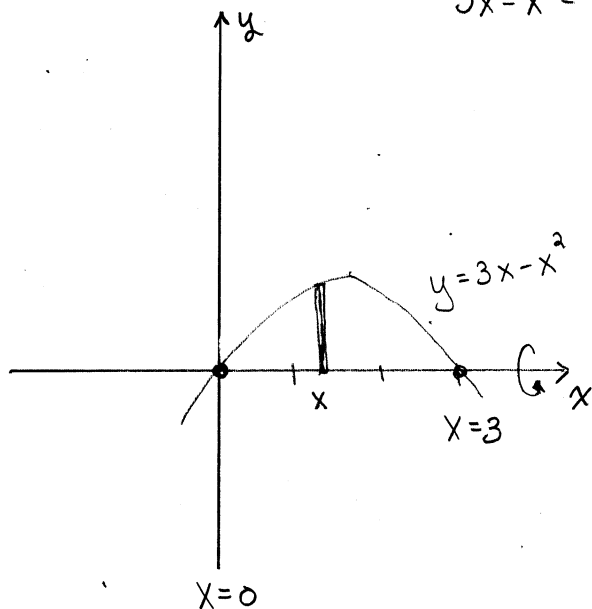
$$\frac{7}{3} \int \sin u du$$

$$= -\frac{7}{3} \cos u + C = \boxed{-\frac{7}{3} \cos(x^3) + C}$$

2. (2 points) The 1st-quadrant region between the x -axis and the graph of ~~the curve~~ is rotated about the x -axis. Find the volume of the solid that is generated.

$$y = 3x - x^2$$

$$3x - x^2 = x(3-x)$$



$$\int_0^3 \pi (3x - x^2)^2 dx$$
$$= \int_0^3 \pi (9x^2 - 6x^3 + x^4) dx$$

$$= \pi \left(3x^3 - \frac{3}{2}x^4 + \frac{1}{5}x^5 \right) \Big|_0^3$$

$$= \pi \left(81 - \frac{243}{2} + \frac{243}{5} \right) =$$

$$\boxed{\frac{81\pi}{10}}$$