BECA / Huson / Unit 12: Integral Calculus Name:
18 May 2023

**12.9 Pre-Quiz: Integral calculus**

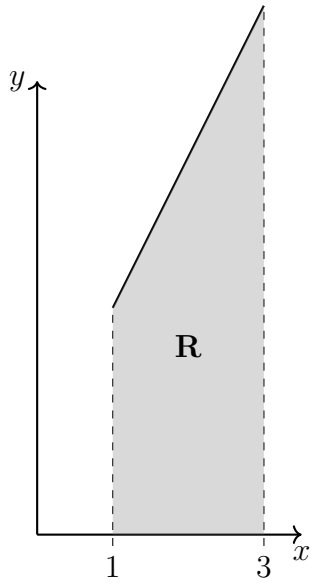
Find the anti-derivative of each polynomial function (include the constant of integration)

1. $f(x) = 4x^3 + 2x$
   $F(x) =$

2. $f(x) = 12x^3 + 9x^2 - 1$
   $F(x) =$

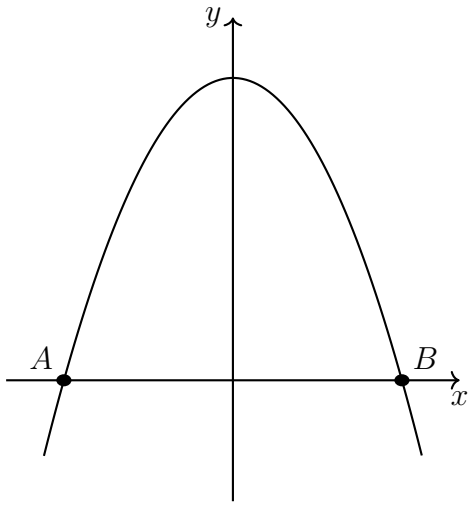
3. A portion of the function $f(x) = 2x + 1$ is plotted below.
   (a) Write down a definite integral that represents the area of the shaded region **R**.

   (b) Calculate the area using geometric formulas.




   (c) Find the area using a definite integral and the methods of calculus.

4. Let $f(x) = 9 - x^2$. Part of the graph of $f$ is shown in the following diagram.




(a) The graph crosses the $x$-axis at the points $A$ and $B$.
Find the $x$-coordinates of $A$ and of $B$.

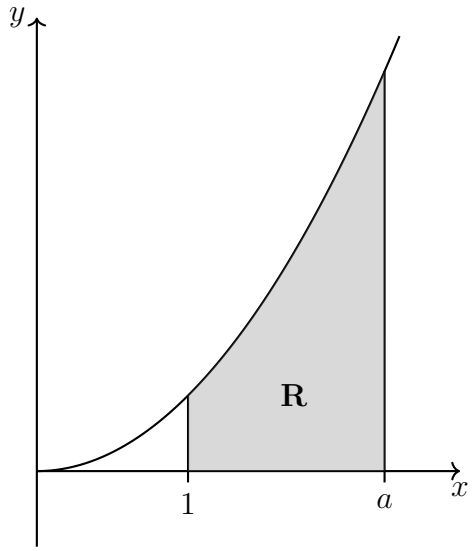
(b) The region enclosed by the graph of $f$ and the $x$-axis has the area $A$. Write down a definite integral that represents $A$.

(c) Find $A$ by using the antiderivative and applying the fundamental theorem of calculus.

BECA / Huson / Unit 12: Integral Calculus Name:
18 May 2023

**Calculator section**

5. The following diagram shows part of the graph of $f(x) = x^2$.




(a) Find $\int_0^1 f(x)\,\mathrm{d}x$

(b) The shaded region $R$ is enclosed by the graph of $f$, the $x$-axis, and the lines $x = 1$ and $x = a$. Find the value of $a$ so that $R \approx 4$.

**Evaluate the function and its derivative for a given value of $x$**

6. Given $f(x) = 4x^2 + 2x$

   (a) Find $f(-1)$

   (b) Find $f'(x)$

   (c) Find $f'(-1)$

BECA / Huson / Unit 12: Integral Calculus Name:
18 May 2023

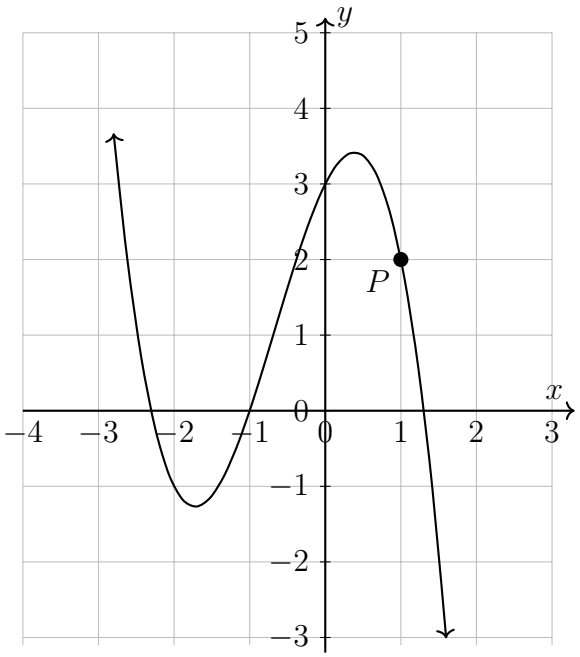
7. The graph shows the polynomial function $y = -x^3 - 2x^2 + 2x + 3$. Its derivative is $\frac{dy}{dx} = -3x^2 - 4x + 2$.

   (a) Write down the coordinates of $P$.

   (b) Find the slope of the tangent at $P$.

   (c) Write down the equation of the tangent line through $P$.

   (d) Draw the tangent line on the graph accurately with a straight edge.




8. The function $y = x^2 - 3x + 2$ is graphed on the grid below. Find its derivative and the equations of the tangent and normal lines through point $(3, 2)$. Draw the lines.