Portfolio

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Purpose

Throughout this course, you will work through a few prompts and collect them together in a course portfolio. These prompts represent key topics in this course. As you progress through the course, you will add to this portfolio and also have an opportunity to go back and edit any previous responses. By the end of the term, you will have a portfolio of work that demonstrates your understanding of this course.

Drafts

Each week, you will submit a draft of a portfolio prompt. Each draft may be submitted as many times as you like. Each draft will receive written feedback to help you edit your next submission. When a submission is polished, the feedback of "great!" will be written at the top of the page. Unless an issue is a minor fix, you will need to rewrite the submission, addressing all of the feedback you received. When submitting a draft,

- Write "Prompt #" at the top of the page, along with your name.
- Write out the entire instructions of the prompt before responding.
- Show all work, and write a sentence to justify anything that is unclear.
- Work vertically – do not write $a = b = c = d$ in a horizontal manner.
- At the end, respond to the prompt with a complete sentence.
- Any new prompt will begin on a new page.
- Any portfolio prompt with a "great!" on it should be saved to submit at the end of the term.

Full Portfolio

This portfolio will be worth 100 points at the end of the term. When you submit your portfolio, create a Cover Sheet. It should say "Portfolio" along with your name. Then include all of the portfolio prompts, in order, and staple your work in the top-left corner.

Prompts

Prompt 1

Find the antiderivative of $f(x) = \frac{1}{1+x^2} + \frac{2}{x} + x^3 - 3$ that passes through the point $\left(-1, \frac{-\pi}{4}\right)$.

Prompt 2

Let $f(x) = \frac{1}{1+x^2} + \frac{2}{x} + x^3 - 3$.

1. Use Desmos or a graphing utility to graph $y = f(x)$. Use this aid to sketch the graph of $y = f(x)$ on a Cartesian plane with $0 < x \leq 6$. Be sure to label your axes, draw tick marks and provide a scale, and label the curves.
2. Let R be the region underneath the graph of $y = f(x)$, above the $x - axis$, to the right of $x = 1$, and to the left of $x = 5$. Sketch R on your graph.
3. Use L_8 to approximate the area of R. Write down all computations exactly, and then round the final conclusion to the nearest thousandth.

Prompt 3

Let R be the region above the x-axis and beneath the graph of $y = \sqrt{16 - x^2}$.

1. Draw R on a Cartesian plane. Be sure to label your axes, draw tick marks and provide a scale, and label the curves.
2. Write an integral that represents the exact value of the area of R.
3. Find the exact value of the area of R. Do not use any technology to aid you in this computation.
4. Suppose this area was restricted to $-2 \leq x \leq 4$. Write an integral to represent this area, then describe why we may have difficulty finding this area.

Prompt 4

Let $f(x) = \frac{1}{1+x^2} + \frac{2}{x} + x^3 - 3$.

1. Use Desmos or a graphing utility to graph $y = f(x)$. Use this aid to sketch the graph of $y = f(x)$ on a Cartesian plane with $0 < x \leq 6$. Be sure to label your axes, draw tick marks and provide a scale, and label the curves.
2. Let R be the region underneath the graph of $y = f(x)$, above the $x - axis$, to the right of $x = 1$, and to the left of $x = 5$. Sketch R on your graph.
3. Write an integral that represents the exact value of the area of R.
4. Find the exact value of the area of R. Do not use any technology to aid you in this computation.
5. Find the average value of $f(x)$ on the interval $[1, 5]$.

Prompt 5

Evaluate the integral $\int_2^e \frac{2}{x \ln x}\, dx$. Describe what this quantity represents in regards to area.

Prompt 6

Evaluate $\int x^2 \cos(2x)\, dx$.

Prompt 7

Find the most general antiderivative of $f(t) = \frac{2t-1}{2t^2-5t-3}$.

Prompt 8

Let R be the region bounded by the curves $y = \csc(x)$, $y = \ln(x)$, $x = 1$, and $x = 2$. Let A be the area of R.

1. Write an integral to represent the exact value of A.
2. Use the Trapezoid Rule with $n = 6$ to approximate the integral you wrote in part (a). Round your conclusion to the nearest thousandth.