

These are suggested review problems similar to what might be on Midterm 3. Included with each problem is a link to a video where you can see how the problem is solved. I didn't make the videos, they are all available on YouTube.

1. Find the intervals of increase and decrease for the function $f(x) = \frac{x}{1+x^2}$.

<https://youtu.be/oThEqQVHo9c>

2. Find the intervals of concavity and inflection points for $f(x) = 6x^5 + x^4 - 5x - 6$.

<https://youtu.be/kivhvloJS7w>

3. Find the following limits.

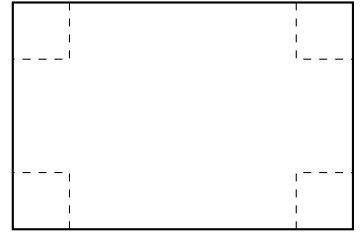
(a) $\lim_{x \rightarrow -\infty} \frac{5x - 7x^3}{2x^2 + 14x^3 - 9}$.

<https://youtu.be/NmLljBAg82o?t=465>

(b) $\lim_{x \rightarrow 0} \frac{\sin(7x)}{\sin(4x)}$.

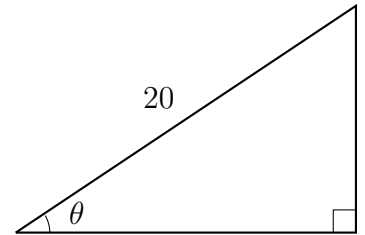
<https://youtu.be/C-aFwHreBOU>

4. A rectangular piece of cardboard is 20 inches by 30 inches. If we cut a square from each corner of the cardboard and fold up the sides to make a box, how big should the squares be in order to maximize the volume?



<https://youtu.be/cRboY08YG8g>

5. The hypotenuse of a right triangle is 20 centimeters long. Find the value of the angle θ that maximizes the perimeter of the triangle.



https://youtu.be/JjNpkQ_5tsY

6. Find $G(x)$ for $x > 0$, given that $G''(x) = 6x + \frac{5}{x^2}$, $G'(1) = 2$ and $G(1) = 3$.

<https://youtu.be/n1fHUjHIgnk>

7. Calculate the following definite integrals.

(a) $\int_{-3}^5 4 \, dx.$

<https://youtu.be/au0cNZFKfo0>

(b) $\int_{\frac{11\pi}{2}}^{6\pi} 9 \sin(x) \, dx.$

<https://youtu.be/ldLdWj6DLTw>

8. Find all antiderivatives of the following functions.

(a) $F'(x) = \frac{2}{3}x^{4/7}.$

<https://youtu.be/n0PeFRNAZ9c>

(b) $f(x) = \frac{x^4 - 2}{x^2}.$

<https://youtu.be/PJFdN3E3mmo>