

These are suggested review problems similar to what might be on Midterm 1. 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. Calculate $\int_0^1 x^2 2^{x^3} dx$.

<https://youtu.be/1ct7LUx23io>

2. Use logarithmic differentiation to find the derivative of $f(x) = (2x - 3)^2(5x^2 + 2)^3$.

<https://youtu.be/SqB-MaegTkY>

3. Evaluate $\log_4(12) - \log_4(36) + \log_4(192)$ without a calculator.

https://youtu.be/H3F5yFJTk_4

4. Calculate $\frac{d}{dx} e^{\cos x} \cos(e^x)$.

<https://youtu.be/UXQGzgPf1LE>

5. Find the derivative of $f(x) = \ln(x^4 + x + 2)$.

<https://youtu.be/-m7gPlGooMk>

6. Simplify $\tan(\sin^{-1}(x))$.

<https://youtu.be/Zud3aCeSLRs>

7. Compute the following without a calculator.

(a) $\sin^{-1}\left(\frac{1}{2}\right)$

(b) $\cos^{-1}\left(\frac{-\sqrt{2}}{2}\right)$

<https://youtu.be/irVcADwXihw>

8. Find the inverse of $f(x) = \frac{2x + 5}{4 - 3x}$.

<https://youtu.be/YI30Ecfl4tc>

9. Set up a Riemann sum with 500 rectangles for the area under the curve $y = \sqrt{1 - x^2}$ from $x = -1$ to $x = 1$.

<https://youtu.be/wLnhngRWtNU>

10. Solve the differential equation $\frac{du}{dt} = \frac{2t + \sec^2 t}{2u}$ with initial condition $u(0) = -5$.

<https://youtu.be/2HeM3gyaUaQ>

11. Solve the differential equation $\frac{dy}{dx} - x = xy^2$.

<https://youtu.be/irtzsCr6k8M>

12. An 80° C bowl of oatmeal is placed in a room that is 20° C . After 2 minutes, the oatmeal is 60° C . Use Newton's law of cooling $T(t) = Ce^{-kt} + T_s$ to find out how long it takes the oatmeal to cool down to 40° C . Hint: First you'll have to find the constants C and k .

<https://youtu.be/jH5qflAe3C8>