• Please see the course webpage for the answer key.

Compute each of the following Integrals

1. $\displaystyle\int_e^{e^3} \frac{4}{x(\ln x)^2}\,dx$ 2. $\displaystyle\int_{\ln 3}^{\ln 8} \frac{e^x}{\sqrt{1+e^x}}\,dx$ 3. $\displaystyle\int_{\ln 2}^{\ln 3} \frac{1}{e^{2x}\left(1-e^{-2x}\right)^2}\,dx$

4. $\displaystyle\int \frac{x}{(3x+1)^2}\,dx$ 5. $\displaystyle\int_{\frac{\pi}{18}}^{\frac{\pi}{9}} \tan(3x)\,dx$

6. Consider $G(x) = \dfrac{1}{\sin\sqrt{e^x+e^7}} + \dfrac{1}{e^{\sqrt{x^2+7\sin x}}} + \dfrac{1}{\sqrt{7+e^{\sin x}}}$

Compute $G'(x)$. Do not simplify here.

7. Consider $F(x) = \sin(\ln(1+x)) - \dfrac{1}{1+\ln(1+3x)}$

Compute the equation of the tangent line to the curve $F(x)$ at the point where $x = 0$.

Think about the graph of $y = \ln x$. We know that $\boxed{\lim_{x\to 0^+} \ln x = \lim_{x\to 0^+} \ln x \overset{0^+}{\to} -\infty}$. Learn this!

Warning: Do **not** write $\ln 0$; it is undefined.

Compute each of the following **Limits involving Logs**. Use arrows to justify the size argument(s).

8. $\displaystyle\lim_{x\to 7^+} \ln(x-7)$

9. $\displaystyle\lim_{x\to 5^-} \ln|x-5|$

10. $\displaystyle\lim_{x\to -6^-} \ln|x+6|$