HOMEWORK ASSIGNMENT

During the course, the HW assignment may be slightly changed. Please, watch the current assignment.
In problems marked by *, the student may skip the final calculations, stopping at the moment when the calculations remained are obvious.

1. 5.1: 1, 2b, 3ab, 7ab, 17.
   5.2: 5, 6, 14, 18, 19,
   5.3: 1, 2, 15, 16, 17a,b(ii), 18a,b(ii), 21ab, 21c*, 31 (use a calculator), 33 (Hint: Is $f'(x)$ positive or negative?).
   5.4: 1–5, 22, 23, 26, 38, 39–42.

Due to August.

2. 6.1: 5, 6, 7–9 (for $F(0) = 1$), 17, 23 (optional).
   6.2: 1-10 (you do not have to write down all problems, but make sure that you can do it), 17–20, 37, 41, 42, 61.
   6.3: 3, 4, 7, 13 (Hint: In this case, as in the case of throwing upward, $v(t) = -gt + C$, but $v(0) = 0$, so $C$ is equal to what? Once you find $v(t)$, find that the height

   \[ h(t) = h_0 - \frac{gt^2}{2}, \]

   where $h_0$ is the initial height equal to 100.)
   6.4: 4, 5, 17 with graphing $F(x)$ for all $x$’s, positive and negative as well. (Hint: First, using the second fundamental theorem, find $F'(x)$. After that, find (using the chain rule) $F''(x)$ and figure out where it is positive and where it is negative.)


7.2: 3, 4 (Advice: Do integration by parts twice), 5, 7, 9, 15 (Advice: Set $u(t) = (\ln t)^2$, and $v(t) = t$), 20 (Advice: Write $\frac{z}{e^z} = ze^{-z}$), 21 (Advice: Set $v'(x) = \frac{1}{x^2}$), 33 (Hint: We considered this integral in class), 35, 45, 46, 53 (Advice: You may take a look at Example 6 on p. 367).
7.3: 1, 2, 22.

Due to August.

3. 7.4: 31, 39*, 41*, 43*, 49*, 52*; compute the integrals:

\[ \int_0^3 \sqrt{9-x^2} \, dx, \quad \int_0^3 x \sqrt{9-x^2} \, dx, \quad \int_0^{3/2} \sqrt{9-4x^2} \, dx, \quad \int_0^{3/2} x \sqrt{9-4x^2} \, dx \]

(in the last integral, you do not have to provide final calculations); 56.

7.6: 1, 5, 7, 8* (optional, do the substitution \( w = \sqrt{x} \)), 9*, 10, 13 (Hint: First, do a substitution and look at how nice the integral becomes after that), 23 (do the substitution \( w = \ln x \)), 29*, 31*.

Additional problem: Consider two integrals:

\[ \int_2^\infty \frac{1}{x \ln^2 x} \, dx, \quad \int_0^\infty \frac{1}{x \ln^2 x} \, dx. \]

First, explain that both integrals converge or diverge simultaneously; in other words, either both converge or both diverge. Secondly, figure out whether they converge or diverge. If the former is true, find the values of both. (Advice: Use the substitution \( w = \ln x. \))

7.7 (in problems below, you may (though do not have to) apply just the limit test): 1, 3, 10, 11, 19, 21, 23.

Due to August.


8.2: 1, 2, 5, 7, 9, 11, 14.

Due to August.

5. In this HW assignment, you may be brief in writing down these problems but, please, make sure that you can do all of them.

9.2: 1, 2, 8, 9-11, 15, 18-20, 26-28, 37.

10.1: 1, 3 (for \( n = 2 \)), 18, 19, 22, 25, 27, 28, 29, 30; write the Taylor polynomial of the third order for \( f(x) = e^{3x} \) and \( \sin(2x) \).

Due to
6. In this HW assignment, you may be brief in writing down these problems but, please, make sure that you can do all of them.

11.1: 1, 2, 4, 6, 16, 17.

11.4: 1, 2, 3, 7, 9, 10, 13, 15, 25.

Due to