
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 14.

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 $\frac{2}{t^2} = ze^{-z}$), 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).
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);

Due to August 21.

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

**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:
\[ \int_{2}^{\infty} \frac{1}{x \ln^2 x} \, dx, \quad \int_{e}^{\infty} \frac{1}{x \ln^2 x} \, dx. \]
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 28.


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

Due to .

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 \( \sin(2x) \).
11.1: 1, 2, 4, 6, 16, 17.

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

Due to.