

# MATH 173 PROBLEM SET 4

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**Problem 1.** TODO

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***Solution.***

- (a) This problem is a simple computation. We see that, with a change of variables  $z = x - a$ , we have

$$\begin{aligned}\hat{f}_a(y) &= \mathcal{F}(f(x - a))(y) \\ &= \int e^{-ixy} f(x - a) dx \\ &= \int e^{-i(z+a)y} f(z) dz \\ &= e^{ia y} \int e^{-izy} f(z) dz \\ &= e^{ia y} \hat{f}(y),\end{aligned}$$

as we wanted.

□

- (b) This problem is even simpler computation. We see that

$$\begin{aligned}\hat{g}_a(y) &= \mathcal{F}(e^{ixa} f(x)) \\ &= \int e^{-ixy} e^{ixa} f(x) dx \\ &= \int e^{-ix(y-a)} f(x) dx \\ &= \hat{f}(y - a),\end{aligned}$$

as we wanted.

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**Problem 2.** TODO

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*Solution.* TODO

**Problem 3.** TODO

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*Solution.* TODO

**Problem 4.** TODO

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*Solution.* TODO

**Problem 5.** TODO

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**Problem 6.** TODO

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*Solution.* TODO

**Problem 7.** TODO

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*Solution.* TODO