50. Find the Fourier series of $f$ is $2\pi$-periodic and on $[-\pi, \pi]$,

(a) $f$ is even;
(b) $f$ is odd;
(c) $f(x) = x$;
(d) $f(x) = |x|$;
(e) $f(x) = \cos(x/2)$;
(f) $f(x) = x^2$;

(g) $f(x) = \begin{cases} 
-1 & \text{if } x \in [-\pi, 0) \\
0 & \text{if } x = 0 \\
1 & \text{if } x \in (0, \pi] 
\end{cases}$.

51. For $|a| < 1$, find

(a) $\sum_{n=0}^{\infty} a^n \cos(n\theta)$;
(b) $\sum_{n=1}^{\infty} a^n \sin(n\theta)$.

52. Work on Problem 12 of Chapter 8 in the textbook.
53. Work on Problem 13 of Chapter 8 in the textbook.
54. Work on Problem 15 of Chapter 8 in the textbook.
55. Show that the $\Gamma$ function is well defined.
56. Find $\Gamma((n + 1)/2)$ and $\Gamma(n/2 + 1)$ for all $n \in \mathbb{N}$.
57. Express $\int_{-1}^{1} (1 - t^2)^{(n-1)/2} dt$ in terms of Gamma functions.
58. Work on Problem 30 of Chapter 8 in the textbook.
59. Work on Problem 31 of Chapter 8 in the textbook.