1. (35 points) An open-loop transfer function is given by,
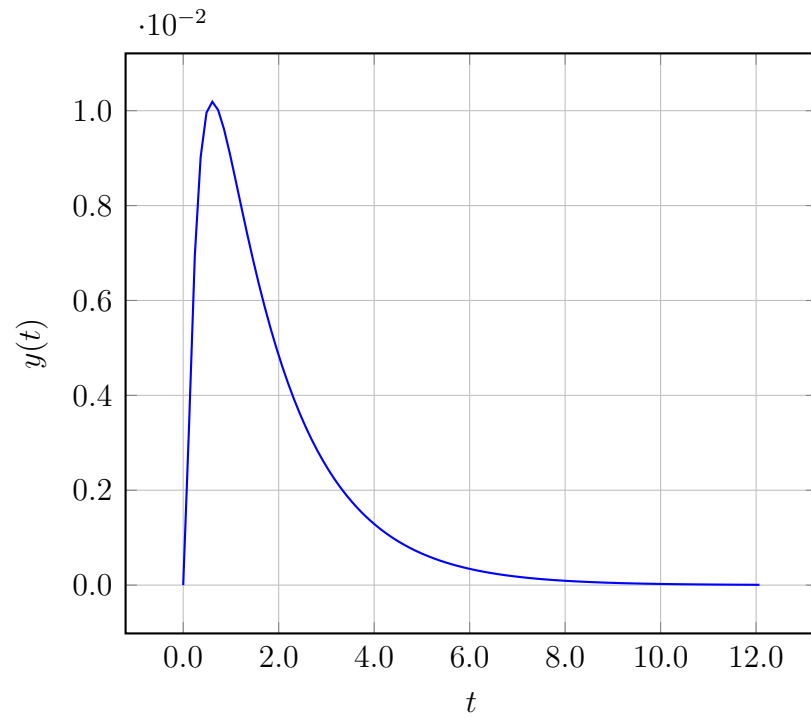
$$G(s) = \frac{1}{s^3 + 2.0s^2 + 3.10605s + 7.10605}$$

Which of the following PI controllers stabilizes the system in a unit-feedback closed-loop configuration?
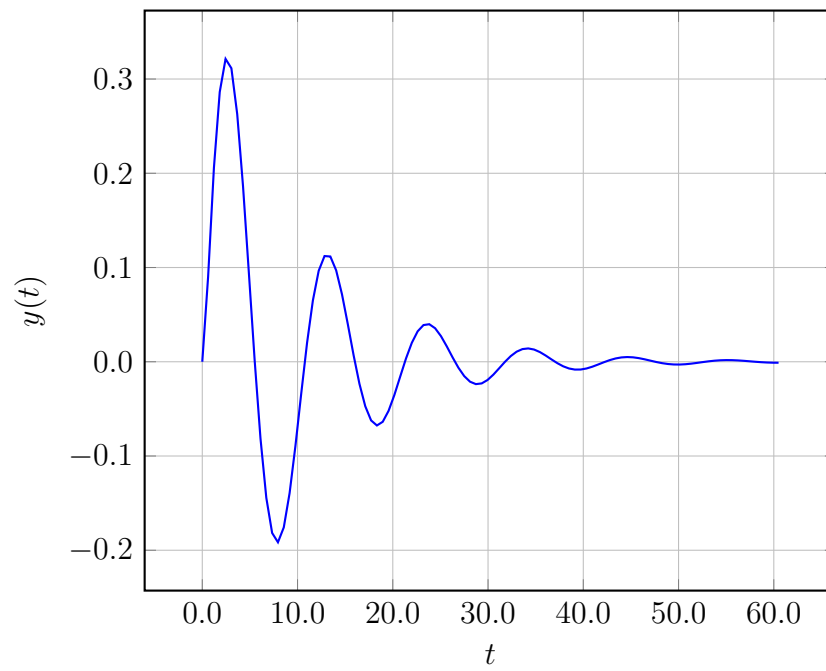
A. $F(s) = -9.57576 + \frac{1.21211}{s}$

B. $F(s) = 1.13635 + \frac{1.21211}{s}$

C. $F(s) = -2.71211 + \frac{0.60605}{s}$

D. $F(s) = 0.92424 + \frac{2.71211}{s}$

E. $F(s) = -9.36365 + \frac{2.71211}{s}$

2. (35 points) Which one of the following unit impulse responses corresponds to a system that does not overshoot when subjected to a unit step input?
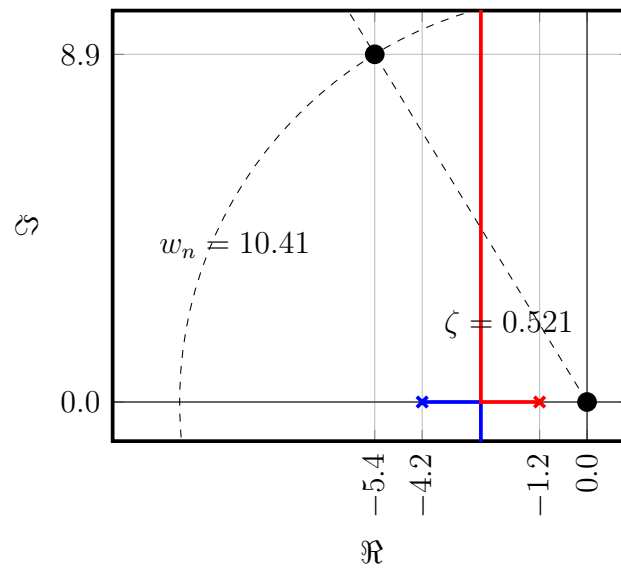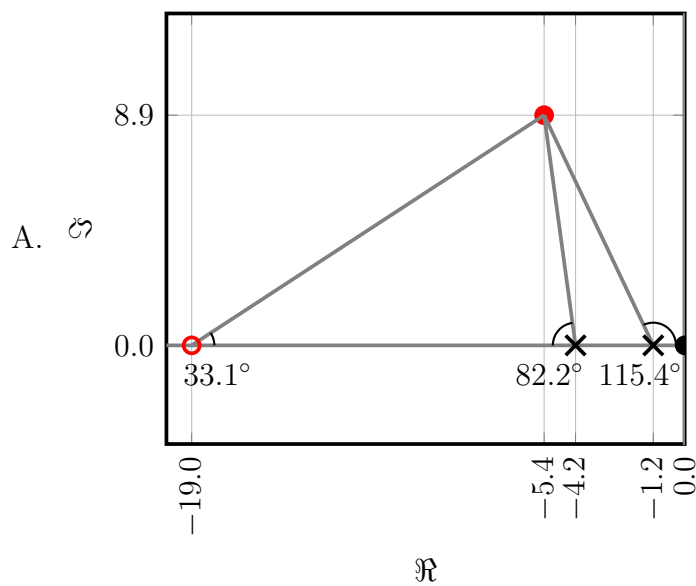
A.

B.

3. (30 points) A design point on the root-locus plot for a P-type controller is shown below.
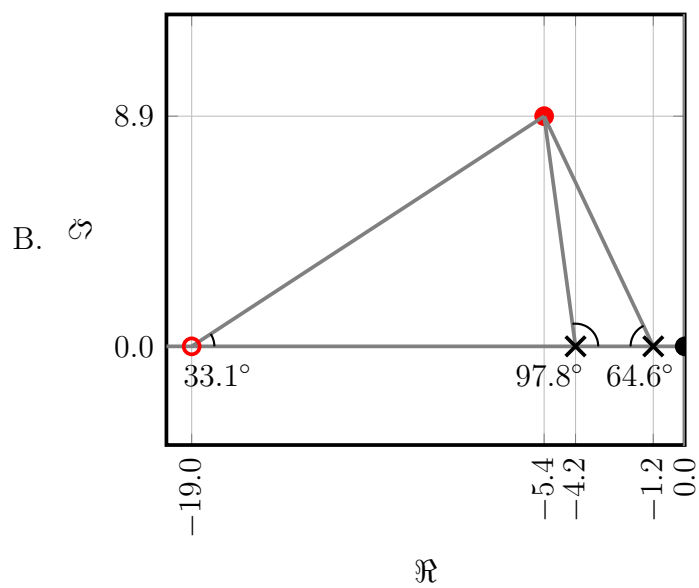

A zero is added so that the root-locus passes through this design point. Which of the following represents the correct angle condition for this design?
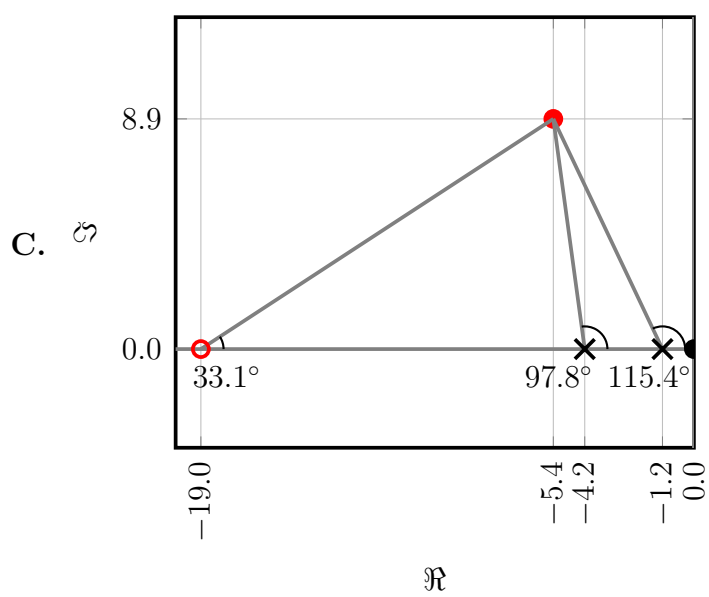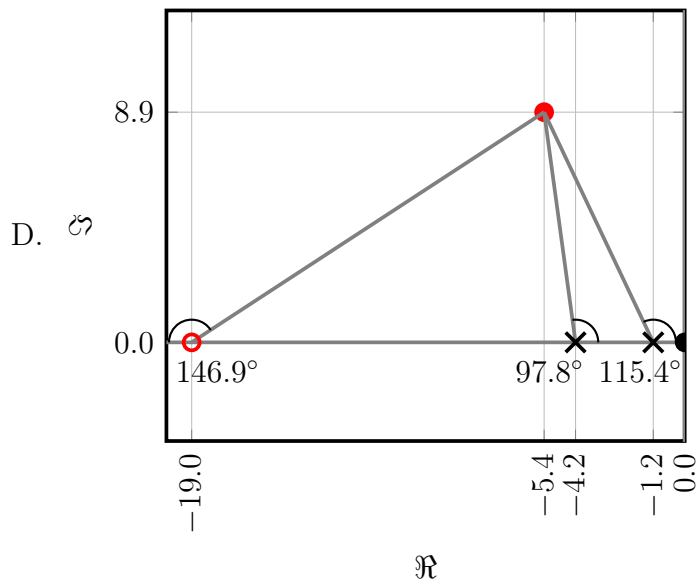
$$\sum \theta = 115.4° + 82.2° + 33.1° = 230.7°$$

A.

$$\sum \theta = 64.6° + 97.8° + 33.1° = 195.5°$$

$$\sum \theta = 115.4° + 97.8° - 33.1° = 180.0°$$

$$\sum \theta = 115.4°+97.8°+146.9° = 360.0°$$

D. $\Im$

Q	A
1	C
2	A
3	C